Telephony.

THE AMERICAN TELEPHONE JOURNAL

Comprising Telephony, American Telephone Journal, Telephone Weekly, Telephone Magazine, Telephone Securities, The Telephone, Sound Waves

PUBLISHED WEEKLY BY THE TELEPHONY PUBLISHING COMPANY

MONADNOCK BLOCK, CHICAGO

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Entered as second-class matter September 4, 1908, at the post office at Chicago, Ill., under act of March 3, 1897

Volume 69
Number 26

CHICAGO, SATURDAY, DECEMBER 25, 1915

Subscription—10 Cents a Copy
$3 a Year U. S., Cuba and Mexico
$4 Canada, $5 Other Countries

Toll Service as a Business Ally.

"From Thanksgiving to Christmas is the real busy time of the year in our business," said an official of one of the largest poultry and produce companies in the country. "Our Christmas business this year, however, will not be as large as it was last year. This is due entirely to storms which interfered greatly with telephone and telegraph service.

"We could not get into quick communication with our managers located out in the country towns, and when our salesmen inquired as to whether we could accept orders of considerable size, we had to refuse them. For instance, one salesman wired us asking if we could accept an order for 20 carloads of turkeys and an answer had to be given that day. Due to telephone and telegraph wires being down, we could not find out from our branches what their supply was. The order, therefore, had to be refused."

Then he told the extensive use which his company makes of the telephone at this season of the year and of experiences in obtaining toll connections. The part which appealed to him as being very peculiar was that while managers out in the country could obtain connection with Chicago, the Chicago office, upon asking for the same connections, was repeatedly told that the wires were down.

Attempts were made to reach a town located in Central Missouri by telephone and telegraph without result. A little later the same day, the manager in that town obtained a connection with Chicago, by telephone. After their unsuccessful attempts to communicate with him, the Chicago officers were curious to know how the connection was established. It was found that a circuit was built up in a roundabout way by the Missouri operator, going via Kansas City and Omaha instead of St. Louis, as was ordinarily done.

In order to obtain communication by telephone, the expedient was adopted of sending out telegrams to the branch managers instructing them to call the Chicago office. A telegram, sent out early in the morning, usually resulted in a response by telephone by noon.

This same firm uses the telephone lines to New York, but the officer quoted, stated that, while telegrams and mail delivery were greatly disturbed by a storm this week, the telephone service was not affected in the least.

The dependence of this company upon uninterrupted facilities for quick communication with its branches is a striking illustration of the value of long distance service. The experiences cited would indicate that the operators in the small places make greater efforts to get calls through than those in the large cities. There may be, of course, reasons, not apparent on the surface, for the ability of places several hundred miles distant, to obtain communication with Chicago while Chicago operators reported communication not obtainable.

The Season's Greeting.

It so happens that this issue is dated December 25, and Telephony therefore extends to all its readers the best wishes of the season. Of course Christmas will have come and gone by the time most of our subscribers read this message, but we would like them to know that, as the paper went to press this week, its editors felt like reaching out a hand to all and wishing them health and happiness.

Likewise, the next issue falls on New Year's Day, and, at the risk of repeating itself, Telephony sincerely desires to wish all telephone men "A Happy New Year." In doing this now we, at least, are as much ahead of the date as we will be behind in our Christmas greetings. Telephony wishes it could ring up every exchange in the United States—yes, in the world—and give a word of greeting to the men and women who handle the telephone business in their respective localities. That would pile up some toll expense, wouldn't it? But that is what is in our hearts, and that is the reason for this brief message. May 1916 bring Good Luck to the telephone workers of the world!

The Wing-ed Men

By HERBERT KAUFMAN

Once upon a time a fairy said to a poor man, "You may have three wishes." Before he could frame the first, his hungry wife cried, "I wish I had a sausage." Turning upon her furiously, he exclaimed, "I wish that sausage was growing on your nose—" At which point you proceed to yawn.

That story bored you as a child. Even your puerile credulity couldn't swallow the sausage, but your children would merely find the tale a very inferior piece of imagination—they know of stranger things than a frankfurter nose.

Vision is the mightiest force of this tremendous era. No inspiration can now seem too impossible or too ridiculous. The Gregorian calendar is obsolete—we've trained a year to behave like a century. We've crammed more action in twelve months than our bigoted, hide-bound, superstitious, precedent-shackled ancestry could ram into the space of a dozen lifetimes.

But we're still ignorant—our past performances but suggest what tomorrow will bring forth. After a while, we'll actually grow up and become wise men. We will comprehend the vast resources of the will and the soul—the inexhaustible potentialities of our brains.

The key that brought the lightning from the clouds, unlocked the vast portals of unseen worlds; the first electric spark lighted the torch for real civilization. We are dealing with powers so infinite that the wildest production of today will be tamed into reality by our children.

Still we've done very well, thank you, in the little while we have indulged in our super-manhood. We've built a few billion dollars' worth of railroads, erected a thousand or so square miles of manufacturing plants, forced Niagara to work for a living, vindicated Mr. Daedalus and cleansed the reputation of the late lamented Darius Green, reduced the transatlantic schedule from five months to five days, adopted Shakespeare's suggestion and thrown a cable girdle around the earth.

We talk across a continent, and talk across an ocean is possible. We embalm voices and paint action; mighty songs are now deathless and glorious spectacles are conceived for eternity. We write history with talking machines and moving picture cameras. We have tools of every size and for every service—one that gnaws 50 tons of isthmus at a bite, another to split hairs on a microbe's nose.

Now sit down and try to think of something that man can't do. We've already accomplished everything that used to be considered as long bow fiction. Call on your imagination for the most improbable undertaking and in six months somebody will be filing a caveat in the patent office on a contrivance to deliver the goods.

We are the wing-ed men, but we wear our pinions within our brows. There is no flight too far for our fancy, no goal too distant for our grasp, no task too great for our doggedness, no peril too awful for our courage—no menace too fearful for our mastery.

Yet all that we have done is but a skirmish—the big battles against ignorance and wrong and darkness are before us. Our methods are still crude—our methods still rude. Here's to the New Year and to Opportunity! Believe! The age of miracles has dawned.

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"Telephony's" Home Study Course for Telephone Men

A Complete Presentation of the Principles Underlying Modern Telephony in All Its Branches—Arranged Systematically So That Regular Reading and Faithful Study Will Qualify Ambitious Men for Higher Positions—Prepared Under Supervision of Stanley R. Edwards—This Section Written by Jay G. Mitchell

Quiz Questions on the Preceding Installment.

260. What, in effect, is the actual nature of any relay?

261. Give one reason for the change in design as relay development occurred.

262. Why does a shorter air gap increase the efficiency of any type of relay?

263. Give another reason for the design of another type of relay aside from the desirability of securing a shorter air gap.

264. State some of the advantageous points of the multi-contact relay.

265. What is essential in any given type of relay?

266. What is a two-pole relay?

CHAPTER XIII. Direct Current Relays.

267. *Method of indicating the spring combination of relays in drawings.*—The practice in the matter of showing the spring arrangements in different types of relays has never been standardized. The writer has found the following method very useful and clear: Imagine a view of the relay looking at the end on which the spring contacts are found. This is the end which is usually seen by the troubleman when he is engaged in clear-

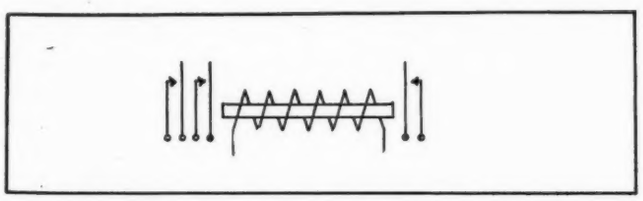


Figure 110. Method of Showing Relay Spring Combinations.

ing a case of relay trouble. Here is where all spring and contact adjustments are made. Those springs which are at the right hand side of the relay may be shown as they are in Fig. 110. Those at the left hand side may be shown in *their* proper position also.

When a circuit is drawn and the relay contacts are placed in accordance with their actual position in the relay structure, it is much easier to trace any circuits that may be involved. For instance, if the circuit drawing should show that a lamp wire was connected to the normally closed back contact spring of the relay at the right hand side, it would be natural to look at the lower right hand side spring in the actual relay when tracing the lamp circuit in the actual equipment. This is not by any means the universal practice, however, and the reader will do well to examine all circuits with care until the method used by the draftsman in making the connection has been ascertained.

268. *General construction of direct current relays.*—The design of direct current telephone relays has been brought to its present high state of perfection by the various manufacturers along lines of development that are in many ways similar. The product of the several factories, while possessing great excellence in all cases, offers some variety in the principles of construction governing the methods pursued to attain the object in view. One of the most common structures for this purpose is shown in Fig. 111.

The armature, *A*, is bent near the center at an angle some-

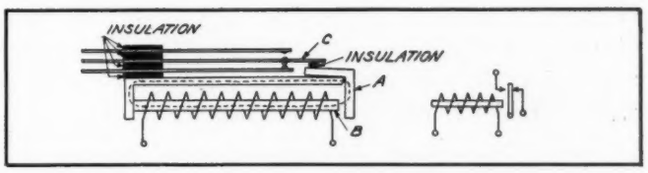


Fig. 111. Rocker Type of Relay Armature.

what greater than a right angle and is then hung on the end of the relay return frame. When the magnetic flux is created by the flow of current through the coil, the lower end of the armature is attracted to the pole, *B*, and its rear end is thrown upward carrying with it the lever spring, *C*.

It can be very readily seen that in this type of relay structure, the air gap may be made very short and the throw of the contact springs still maintained at its proper length. This is an extremely easy type of relay to keep in adjustment as the shape of the armature bend and the air gap is fixed, while the springs only require occasional attention to insure the proper relation between the contact points.

In Fig. 112 is shown another typical relay structure for use with direct current. In this form of frame, the armature is below the balance of the relay frame and is pivoted at the rear end. When the coil is energized by the flow of current through it, the armature, *A*, tends to place itself in the magnetic field as much as possible. It is therefore drawn to the forward

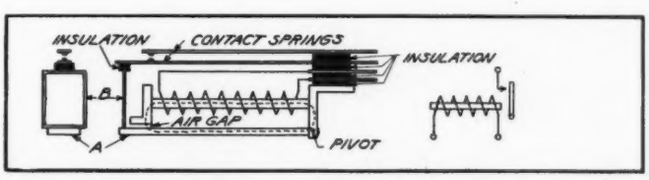


Fig. 112. Underhung Type of Relay.

pole, carrying the contact springs with it through the medium of the saddle, *B*.

This relay is very satisfactory and has been placed in operation in great numbers, especially in manual switchboard equipment. It is very clear that both the type of relay structure shown in Fig. 111 and that shown in Fig. 112 are well adapted to the operation of more than one pole or set of springs. For this reason they are both used as the standard type of relay

frame in all classes of relay service by their respective manufacturers, with the very best results as far as economy and reliability are concerned.

269. *Magnetism and its application to relays.*—In both Figs. 111 and 112, the magnetic lines of force have been indicated by use of dotted lines. The reader will do well to review the general subject of magnetism in connection with the analysis of the magnetic circuits of the different types of relay. It will be remembered that the rule governing the effect of a magnetic field upon a mass of iron, free to move, is to cause the iron to so place itself as to include in its own mass the greatest possible number of magnetic lines of force. In every case the action of a relay armature may be outlined in advance by an application of this rule.

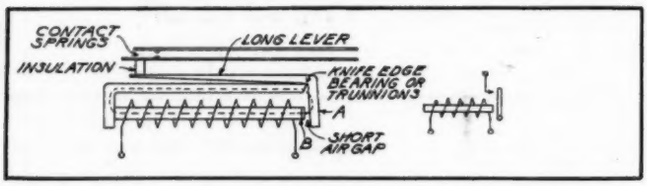


Fig. 113. Principle of Short Air Gap, Quick-Acting Relay.

In the study of the action of all forms of relays, it should also be noted that when the relay has operated and the armature has so placed itself as to include in itself the greatest possible number of magnetic lines of force, then the reluctance of the magnetic circuit is reduced and the strength of the flux is increased. In other words, the current flowing in the coil of any relay will cause the armature to be held in the operated position with greater magnetic pull than would be the case were the armature in the normal or inoperated position.

270. *The quick-acting, direct current relay.*—There are general conditions of operation which separate all direct current relays into two classes. In some cases the relay is designed to operate with a continuous flow of current through its windings for an appreciable length of time. In other cases the circuit and operating conditions are such that the flow of current in the winding is not continuous, persisting for a short time only and then being interrupted.

In the first case, the relay winding must be designed with the object of producing only so many heat units in the coil as can be readily carried away through the frame, the air, and the mounting. In the second case, the interrupted flow of current, by allowing time for cooling, prevents any dangerous and destructive rise in temperature in the winding. It is then possible to utilize windings which, being made from larger wire, are of lower resistance and capable of carrying a much higher amperage than would be possible if the operating current flow were continuous. In other words, it is possible in such cases to expend much more energy in the coil of a relay during the time the current is flowing without damage than would be the case if the current were continuous.

In TELEPHONY, of July 17, Home Study Course, Section No. 151 and of August 21, Sections Nos. 168 and 169, the general subject of the development of heat in an electrical conductor due to the flow of current through it, was discussed. It should be very clear, therefore, that the winding of any relay for any sort of continuous service should not be such as to produce the heat units faster, when operating under normal conditions, than may be readily conducted away by the frame, the air, and supports. On the other hand, if the flow of current in the relay winding is to be interrupted, it is perfectly feasible, in order to secure stronger mechanical action, to arrange for a much stronger current flow than would be possible otherwise.

271. *Air gap of quick-acting relays.*—In all forms of mechanical or so-called automatic telephone switching apparatus that have been placed in actual operation, the actuating or driving currents are pulsating or interrupted in character and the length of time that the current flows continuously through the various stepping relay windings is very short. Since quick and positive action is necessary in the local circuits of such relays, they are so made that the air gap is *very short* while the actuating current impulses are very strong. The lever which is a part of the armature and which moves the contact spring or springs, is made as long as possible in order to assure the widest possible movement of the moving contact points with a comparatively short travel of the armature itself.

By these means—short air gap and large number of ampere turns—the magnetic flux in the core, armature and frame is built up very quickly after the current begins to flow in the winding and the relay is made very fast in action. Usually a rather stiff spring adjustment insures the release of the armature immediately the energizing current is withdrawn, as the tension of the springs against which the armature is operated, is strong enough to instantly overcome the attractive force of the residual magnetic field in the core. The residual magnetic field may be said to be due to the magnetic memory of the iron core and frame.

One type of relay structure to attain this object is shown in Fig. 113. In this figure, *A* is the armature attached to a long lever which works against the contact springs and *B* is the pole of the core. There is some little difference in the mechanical details and arrangement of the relays of this class produced by the various manufacturers, but the short air gap and long contact spring lever are found in all. It is sometimes advisable to adjust relays of this type so that the armature is well started on its throw before the long lever spring has reached and begun to move the contact spring. By this method, the inertia or dead weight of the relay moving parts is overcome before they are required to do any work in opposing the tension of the contact springs.

(*To be Continued*)

[EDITOR'S NOTE: Owing to an oversight in checking, an error slipped through in the drawing of the "Spring suspended armature relay." In Fig. 109, the frame of the relay is shown extending between the two magnet heads at the ends of the core and below the relay winding from end to end. There should be no frame extension of the relay heads below the winding, as the armature serves for the return path for the magnetic lines of force. In other words, all that part of the frame below the winding should not have been included in the drawing, as it is not found in this type of relay.]

Telephone Lines to New Oklahoma Oil Field.

Such growth has been attained by the new oil field at Newkirk, Okla., that the Pioneer Telephone & Telegraph Co. has constructed special lines from the Newkirk exchange, reaching every point in the producing section.

Looking Back

The Dying Year—How Far We Have Progressed

By J. C. Kelsey

Lot's wife looked back and was turned into a pillar of salt. One cannot help but wonder at the injustice of the punishment, for it is by looking back, occasionally, that we can tell how far we have advanced into the boundless future.

It is only by the experience or the happenings of the past that we can hope to steer properly through the mazes of the future. Lot's wife was punished because her looking back was not for analytical purposes—it was for pleasure purposes only.

We can look back upon the dying year with somewhat the purposes that influenced Lot's wife to look back. We can look back with pleasure upon 1915 that our country is not filled with hospitals, Red Cross nurses, and tramping soldiers.

We can be pleased that the difficult task of steering a neutral country through the mazes of national hatreds, has been successfully accomplished. It may be that here and there we have alienated some national affection, but we are willing to face that as long as the penalties lie in the future. Affection between nations is somewhat of a minus quantity anyway.

Telephone men can look back upon 1915 with a great deal of pleasure.

It is the year which brought our dissenting factions together again.

We had, unconsciously possibly, strayed into differences of opinion upon the form of things rather than the thing itself. Old friends, who had fought together for years and who had identically the same problems, no longer spoke frankly as they passed by. All the work of years of some institutions had been forgotten and even abused, because we no longer agreed on forms of worship. We surely had fallen into grievous times.

Dissension is ever a factor in progress. It is a form of competition which brings out of each contending group new forms of activity. Dissension among telephone men gave us four national conventions in 1915. All four of these conventions were good and useful ones and they brought together telephone men who had never been together before.

It was good to see telephone men from New England, New York, Pennsylvania, Tennessee and Alabama meeting at Minneapolis last January. It was good to see them again at the Chicago convention two weeks later, meeting men from north and west. The San Francisco meeting of our California brothers and their Eastern friends was well worth every effort. And the recent Chicago meeting, which had telephone men from Maine and Florida to California present, went to show that 1915 was to be a banner year of them all.

Dissension is a great factor in progress, provlding the people engaged in it get together and mutually profit by what each has accomplished.

The two associations, by reason of the differences in the past, brought out telephone men who never cared about associations before and taught them to contribute. Many of us in the past, being independent in every sense, put our hands on our pocketbooks and refused to help, simply because we felt that our business was a local issue strictly.

We were told by Secretary MacKinnon how we ignored the association by making personal appeals and how much more effective we would be politically if we would rely more on concerted association action and less on individual efforts.

It confuses anyone to listen to individual appeals because each one is conflicting. How can a house or senate committee get at the root of matters unless telephone men make a composite picture of their needs? How much more economical and effective it would be if we would go far enough to make our association a centralized machine.

We have already learned that one man with a machine gun can do more effective work than 100 men with rifles. So can one organization at Washington and Chicago do more effective work than one hundred telephone men appearing as witnesses or protestors. Besides, look at the saving of expense as well. Let us take advantage of our one form of concentrated effort. If we can do this, not one day of the last few years has been wasted.

Out of 1915 has come that most desired condition of unity. It is hardly possible that we will ever have a complete unity, because each locality has its own distinct problem. Yet as a group, we can have a unity so far as offensive and defensive necessities go.

We must be in unity so far as realizing that changing time brings changing economic conditions. We must be in unity so far as a realization that what the public wills, we must also will. We must realize that the public is our master—a master which knows no creed, sect, or faction. The public absolutely dictates, and we must try to negotiate with it or fall in the process of war to the death.

Whatever we wish and however we feel, we must admit that conditions and not theories must guide us. Things are said today and done today, which could not be tolerated yesterday.

In 1909, Charles S. Norton, secretary of the Indiana Independent Telephone Association, made the following remarks in the Indiana bulletin for which he was greatly censured:

"The day of destructive competition in telephone service should be passed. While it is true that conditions in former years made competition the only remedy for securing good telephone service at reasonable prices, and while it is true that either competition or the possibility of competition is securing more extended service at better rates than otherwise could be secured, it is not true that competition, in order to be effective, should be destructive of the interests of either or both rival companies."

Today, nearly beginning 1916, do you see anything unorthodox in a statement that there is no necessity for destructive competition? Do you see anything radically wrong with the following Norton quotation, at least from what has happened since 1909: "Whether competition be meritorious or not, depends wholly upon the place and conditions under which telephone service is given. No one believes that in the *smaller towns* and rural communities, where each person has business or social relations with all other persons, the public should bear the burden of a divided telephone service, whatever may be the arguments for competition in cities where our individual business and social relations embrace only a fractional part of the entire population. There can be no valid argument for two telephone systems in the

smaller places, provided such places have a right to own and operate a telephone system in their own way."

Look into the smaller town situation and see if the public will bear the burden or has borne it. The public would not bear the burden of a second service at Johnstown, Pa., although the Bell interests spent a half million dollars trying to give it. Ft. Wayne, Logansport, Oil City, Mankato, show that the public will not serve two masters; nor will it in South Bend, Freeport, Galesburg and such towns where vigorous competition is still attempted.

In no locality of these sizes do both companies prosper, while the fact is that the Bell company invariably loses money. Were it not for support from a general treasury, the Bell company would today be extinct in cities of smaller size.

The economic answer has been emphatically in favor of one telephone company—and an Independent company at that, if it started early enough.

Regarding the localities where business and social relations embrace only a fractional part, the facts are not so clear.

Some telephone men insist that, even in larger cities, there is no example where both companies prosper, and that both must lose. Yet Philadelphia, St. Louis, Cleveland, Buffalo, Minneapolis, Columbus, Dallas and St. Paul, show that the Independents, while in the minority, are holding their own, paying interest and dividends and making necessary extensions.

Kansas City, Los Angeles, Louisville and Rochester show Independents in the majority, while Chicago, Houston, Jackson, Harrisburg and some other points show little or no public approval.

It is plain that the issue of the economic survivor in the larger cities is yet an unsettled problem, or a problem not even needing settlement. However, we may expect considerable action along these lines, possibly during 1916.

Commissioner Waltermire, of Ohio, told the convention that persons could possibly resist an economic law for a time, but would eventually be swept away by the deluge. We can resist the public will for a time, but we must beware lest we be engulfed in the whirlpools of our stubbornness.

We know that we must all die and we quarrel little over the fact. We know that the world changes, ideas change, thoughts change just as our bodies do in the flight of time. We know that changes must come in our business, and we cannot stop them but for a moment. So let us make up our minds to accept changes more cheerfully, and not try to blame men for them instead of conditions over which we really have no control.

At times we are frightened by the changes. Nature makes death easy and welcome by causing old men to refuse to accept changes.

It seems at times as if our work of years was to be swept into discard. How frightened we were when the Lincoln deal was made and how much time we lost in worrying over the celebrated Ohio deal. We worried over Indianapolis, Kansas City, and Sioux City, yet we are alive and well today and business seems to go on as well as before.

We worry over Bell aggressions at times, yet we never give a thought to their frame of mind over Independent aggressions. There was a time when their work of years seemed utterly lost, yet you must admit their courage at the time of crisis and their faith in the telephone business.

Don't think for a moment that the lot of a Bell official is all happiness. He earns every dollar of his salary. He has hours of discouragement just as well as all of us do. We think of him as a devouring lion and he, alone, knows that he is far from it. He tries to meet us half way, but we are suspicious of him—we think of the Greek bearing gifts and back away.

We know the tendency of some of the Bell employes to look upon our willingness to talk peace as a token of surrender. And we know our tendency to over-rate the powers of a Bell employe. Let us remember 1915 as a time when the power of money as a moral and political force, reached the lowest ebb.

We would like to see the Bell company reveal the proper confidence in itself by throwing down all the bars it has erected. If the Bell company was the roaring, all-devouring lion some of us think it is, it could abandon its manufacturing contract. If it was as sure of its strength as some of us believe it to be, it would connect with all companies alike and take its chances.

It is true that some of its local plants already suffering, might suffer more, yet a bold decision to end the life of its already suffering plants would be good business.

Why should it be unwise to give up local exchanges at LaCrosse, Galesburg, Bloomington, and numerous competitive points even at a price less than cost? Is it good business to hold out for a price or principle when losses reach as high as $20,000 a year? Or do the Bell people prefer to take a loss merely to save their faces?

The telephone business would leap to the front in one hour after such a decision on the part of the Bell interests had been made. Net earnings, at the present low rates would be so evident that no bank examiner, or any dealer in investment securities, would ever raise his hand against the telephone. As matters stand today, when telephone people refuse to be efficient in net earnings, the critics cannot be blamed.

At the risk of censure, I am going to quit looking back and look ahead. The present hour shows the lowest pulse the patient has ever had. No one can deny that the telephone industry has been sick.

Twenty years ago the electrical industry was sick, and the great General Electric Co. of today, was then a very low-spirited invalid. Other concerns of similar character were equally discouraged and it seemed as if the world had enough electric light and power to last it forever.

There were plenty of men who could see the end and made no little noise over their discovery. Today, has any man need of shame because of the great electrical industry?

The telephone business has had to run its gauntlet too. It has had to weed out the unfit and has had to examine the diverging roads ahead before starting out to fulfillment. We are not better or not more superman than our electric contemporaries and we have our growing pains just as they had.

I believe none of us can picture the telephone business of ten years hence, not even the most optimistic prophet. Does anyone believe that our twenty and thirty years of experience will go for naught? Not in history has human experience failed to be worth its sacrifice.

We have reason to be proud of our wonderful factories, our well-built exchanges and our wide acquaintance with the public. We have reason to be proud of our leaders who have laid aside their differences and, together, are leading the way to our destiny. May they all live to see its fulfillment.

MORAL: It is darkest just before dawn.

Service Cost of Telephones Described by Commission

Epochal Decision of Wisconsin Railroad Commission Relative to Costs for Different Classes of Telephone Service—In Application of St. Croix Telephone Co. for Rate Increase, Cost of Service Is Allocated to Each Class of Subscriber—Second Installment

First Apportionment of Expense.

The major expense items entering into the operation of a telephone utility according to the Wisconsin classification of accounts are as follows: Central office operators' salaries, central office supplies and expenses, central office maintenance, wire plant expense, substation expense, general and undistributed expense, and interest and depreciation on property. In this apportionment, we will endeavor to *allocate* to each class of service the expenses in these groups.

Central Office Operators' Salaries.

The item "central office operators' salaries" is first divided between "Toll" and "New Richmond," the term "New Richmond" in this sense to mean all classes of service except toll. This division is made on the basis of the actual amount of time which the operators spent operating the *toll* or the *local* switchboards, but no part of the time spent at the local board is charged to toll at this point. Table No. 1, gives the detail of this division.

The table shows a total yearly charge of $2,208 to "Central Office Operators' Salaries" whereas the actual expense as shown by the company's books is $2,264.89—a difference of $56.89. Apportioning this amount on the basis of the results shown in the table, we have the total amount of operators' salary expenses divided as follows: Toll, $748.60, New Richmond, $1,516.29.

The *second apportionment* of the New Richmond portion of this expense ($1,516.29) will apportion this amount to the various classes of service of the New Richmond exchange, including toll, on the basis of *use* as indicated by the traffic study. This will be taken up later under the heading, "Second Apportionment."

Central Offices Supplies and Expenses.

A study of the company's books and expense vouchers showed that in order to obtain allocations of the expense, "Central Office Supplies and Expenses," on logical bases, the following sub-items would be necessary:

(a) Directory and stationery	$ 84.99
(b) Power and freight	62.28
(c) Fuel, water, light, and maintenance of building	138.63
(d) Miscellaneous	52.49
Total	$338.39

It seems evident that "Directory and Stationery Expense" would be in proportion to the number of substations, consequently this item is apportioned to the various classes on "Substation Basis No. 1." Although some space in the directory is reserved for instructions on long distance talking, no charge was made to the toll service for this advertising.

The second item, "Power and Freight," consists chiefly of battery costs and freight thereon. In apportioning this expense on the "Ringing Basis," various factors were used to compensate for the code ringing on rural lines.

The item, "Fuel, Water, Light and Maintenance of Building," was apportioned somewhat arbitrarily between New Richmond and toll, after approximating the space utilized by each and the relative number of operators employed. This study resulted in charging 20 per cent. of the item to toll and 80 per cent. to New Richmond. The latter portion was then distributed to the local classes of service 50 per cent. on the "Substation Basis No. 1" and 50 per cent. on "Line Basis No. 2."

Miscellaneous expense was apportioned as an overhead to the items which have just been named.

Operator	Monthly Salary	Div. to Toll Based on Actual Time Spent	Div. to Local Based on Actual Time Spent
A	$ 25.00	$ 15.65	$ 9.35
B	25.00	0.00	25.00
C	27.00	27.00	0.00
D	20.00	0.00	20.00
E	27.00	1.35	25.65
F	23.00	0.00	23.00
Totals	$147.00	$ 44.00	$103.00
Percentages	100.00	30.00	70.00
*Chief operator's salary	37.00	8.20	
		8.60	20.20
Total per month	$ 184.00	$ 60.80	$ 123.20
Total per year	2,208.00	729.00	1,478.40
	56.89	19.00	37.89
Total	$2,264.89	$748.60	$1,516.29

*A portion of the chief operator's time represented by $8.20 is charged directly to toll to compensate for certain clerical work connected with toll tickets. The remainder of her salary is apportioned as an overhead expense.

Table No. 1. Apportionment of "Operators' Salaries."

	Toll			New Richmond			Apportionment of New Richmond Portion.								
	Apportionment Basis	Per Cent.	Amount	Per Cent.	Amount	Apportionment Basis	Residence Per Cent.	Residence Am'nt	Business Per Cent.	Business Am'nt	St. Croix Rural Per Cent.	St. Croix Rural Am'nt	Foreign Rural Per Cent.	Foreign Rural Am'nt	Total Am'nt
Directory and stationery		0.0		100	$ 84.99	Substation No. 1	33.0	$28.05	9.7	$ 8.24	18.6	$15.81	38.7	$32.89	$ 84.99
Power and freight		9.2	$5.73	90.8	56.55	Ringing	18.2	10.28	9.7	5.48	26.4	14.95	45.7	25.84	62.28
Fuel, water and light and maintenance of building	Operators' time and floor space	20.0	27.73	80.0	55.45	Substation No. 1	33.0	18.30	9.7	5.39	18.6	10.31	38.7	21.45	69.32
					55.45	Lines No. 2	68.5	38.00	21.3	11.80	3.4	1.88	6.8	3.77	69.31
Total			$33.46		$252.44			$ 94.63		$30.91		$42.95		$83.95	$285.90
Percentages			11.7		88.3			33.1		10.8		15.0		29.4	100.
Miscellaneous Overhead			6.15		46.34	Overhead		17.37		5.67		7.87		15.43	52.49
Total			$39.61		$298.78			$112.00		$36.58		$50.82		$99.38	$338.39

Table No. 2. First Apportionment of Central Office Supplies and Expenses.

A summary of "Central Office Supplies and Expenses" apportioned as outlined on the preceding page and as they appear in detail in Table No. 2, is as follows:

Total	$333.39
Toll	39.61
New Richmond	298.78
Residence	112.00
Business	36.58
St. Croix rural	50.82
Foreign rural	99.38

CENTRAL OFFICE MAINTENANCE.

The most logical method presenting itself for the apportioning of "Central Office Expense" involves both the number of lines per class and originating calls per class. Giving equal

	Lines Basis No. 1, Percentages.	Originating Calls Basis, Percentages.	Average of Bases, Percentages.	Central Office Maintenance Apportioned to Each Class on Preceding Average on Bases.
Toll	2.70	9.9	6.30	$ 4.48
New Richmond				
Residence	66.97	24.7	45.75	$32.32
Business	20.33	18.3	19.40	13.87
St. Croix rural	3.30	17.5	10.40	7.37
Foreign rural	6.70	29.6	18.15	12.86
Total	100.00	100.00	100.00	$70.90

Note: For detail of bases of apportionment, see page 20, TELEPHONY, December 18.

Table No. 3. Apportionment of Central Office Maintenance.

weight to these two factors results in distribution of expense as shown in Table No. 3.

WIRE PLANT AND SUBSTATION OPERATION AND MAINTENANCE.

It appears reasonable to assume that the "Wire Plant Operation and Maintenance Expense" and the "Substation Operation and Maintenance Expense" of the property involved in this case will be approximately proportional, respectively, to the wire miles and substations involved in each class of service. However, as a check upon the use of this method, an analysis has been made of the trouble tickets for the New Richmond exchange for a period covering some three months. This analysis appears to bear out the foregoing assumption, hence we feel justified in this case in the application of these bases of apportionment to the wire plant and substation expenses of this company. Table No. 4 details these apportionments.

Items entering into the "Apportionment of Commercial Expense" were found to be so varied that its details were obtained and the separate items apportioned to toll and New Richmond on various bases in Table No. 5. The percentages used are estimates based upon a fairly comprehensive knowledge of the use to which the various items appearing in the account are put.

The "New Richmond" portion as shown in Table No. 5 was

		New Richmond.			
Total Expense.	Bases.	Residence.	Business.	St. Croix Rural.	Foreign Rural.
	Wire Mile	27.0%	4%	65.5%	3.5%
$643.19	Basis No.1	$173.68	$25.73	$421.27	$22.51
First apportionment of Substation Maintenance and Operation.					
	Substation.	54.1%	16.0%	29.9%	0.0%
$912.32	Basis No. 3	$493.59	$146.01	$272.72	$0.00

Table No. 4. First Apportionment of Wire Plant Maintenance and Operation.

then reapportioned among the various local classes of service on the "billing" basis, as given in Table No. 6.

Preparatory to the determination of the depreciation charge which should be made to each class of service, it was ascertained from the details of the valuation just what amounts of money were invested in property which serves directly each class of service. These amounts were then further divided up into the life groups applying to the various classes of construction, and the depreciation on each life group for each class of service was determined. These operations are carried out in detail in the Table No. 7. The results of the computations shown in the last column of this table are transferred directly

	Toll		New Richmond		Total
	Per cent.	Amt.	Per cent.	Amt.	Amt.
Bookkeeper's salary	67	$116.00	33	$ 57.50	$173.50
Envelopes	50	24.36	50	24.36	48.72
Toll slips	100	6.00	----	------	6.00
Subscribers' ledger	25	1.25	75	3.75	5.00
Advertising fair	----	------	100	5.00	5.00
Rental and toll record	50	2.25	50	2.25	4.50
Bill heads	15	.25	85	1.50	1.75
Rental bills	50	3.50	50	3.50	7.00
Toll bills	100	4.50	----	------	4.50
Trouble and toll tickets	50	1.47	50	1.48	2.95
Pens	25	.51	75	1.53	2.04
Advertising	----	------	100	1.15	1.15
Envelopes	25	1.19	75	3.56	4.75
Postage	50	21.86	50	21.86	43.72
Telephone bills	----	------	100	3.10	3.10
Pay roll (labor)	50	17.34	50	17.35	34.69
Uncollectible accounts	----	7.40	----	70.00	77.40
Petty cash (misc. prtg.)	----	------	100	3.35	3.35
		$207.88		$221.24	$429.12

Table No. 5. Detail of Apportionment of Commercial Expenses.

to the final summary of the first apportionment, Table No. 9.

The following is in explanation of Table No. 7:

Depreciation on Building amounts to a total of $49.28. This amount is first apportioned 20 per cent. to Toll ($9.86) and 80 per cent. to New Richmond ($39.42) which basis takes into consideration the approximate space utilized and number of toll operators as compared with number of local operators. The New Richmond portion is then divided equally between "Central office" and "General office" ($19.71), the "General office" portion being added to the depreciation already computed on "General office equipment." The central office portion is apportioned among the various classes of local service on the "Lines Basis No. 2." The amounts thus computed are

	Telephones.	Billings per Year.	Total.	Per cent.	Amount.
Residence telephones	291	12	3,492	.66	$146.02
Business telephones	86	12	1,032	.20	44.25
St. Croix rural	161	4	644	12	26.55
Foreign	26	4	104	.02	4.42
Total			5,272	100	$221.24
Toll					207.88
Total					$429.12

Table No. 6. Billing Basis of Local Commercial Expense.

added to the depreciation already allocated to the various classes of service.

The last column in the table summarizes the depreciation for each class of service. This summary includes apportionments of all depreciation except the general office portion of the depreciation on building ($19.71) and the depreciation on general office equipment ($65.37) representing a total of $85.08. This amount will be considered as a part of the general expense which later—in the Second Apportionment—will be apportioned as an overhead charge on the final apportionment of the rest of the expenses of the utility.

INTEREST ON FAIR VALUE OF PROPERTY.

The computations for the "Interest" allocations are much the same as for depreciation. The "present values" of the classes of equipment coming under various classes of service have been totaled from the details of the valuation, and 12 per cent. added for overhead during construction. Apportionments of "land" and "building" present values to these classes of equipment have then been made and percentages of the grand total for each class of equipment have been determined. The total interest upon the fair value of the property has then been ap-

portioned upon the basis of these percentages. Table No. 8 gives the detail of these computations.

The total building and land investment amounts to $6,216. This is apportioned 20 per cent. to Toll ($1,243) and 80 per cent. to New Richmond ($4,973), the same basis being used as in the apportionment of depreciation. Of the New Richmond portion, 50 per cent. is charged to Central Office ($2,486) and 50 per cent. to General Office ($2,487). The Central Office portion is then apportioned among the various classes of local service on the basis of number of lines (Lines Basis No. 2, page 20, TELEPHONY of December 18) and the General Office portion is added to the General Office Equipment Present Value. After adding these amounts to their respective classes, the percentage which each subtotal is of the grand total, is determined, and the total interest is apportioned upon this basis.

Classes of Service.	Classes of Equipment.	Life of Equipment	Cost of Reproduction of Property.	Scrap Values	Cost of Reproduction less Scrap.	*Add 12 per cent.	Annual 1 per cent. for Depreciation on 2 per cent. Sinking Fund Basis	Amount of the Annual Depreciation Fund.	Add Apportioned Depreciation on Part of Building.	Total Depreciation Allocated to Classes of Service and Classes of Property.
Toll		....	.....	.....	.....	.....	.....	.....	$ 9.86	$ 9.86
Residence—										
	Central office	12	$1,167		$1,167	$1,307	.0746	$ 97.51		97.51
		10	241		241	270	.0913	24.65		
	Wire	12	4,582	2,896	1,682	1,884	.0746	140.55		311.95
	Plant	15	2,267		2,267	2,539	.0578	146.75		
	Substation	10	3,402		3,402	3,810	.0913	347.85		347.85
	Building								13.50	13.50
Business—										
	Central office	12	369		369	413	.0746	30.81		30.81
		10	36		36	40	.0913	3.65		
	Wire	12	685	483	202	226	.0746	16.86		42.47
	Plant	15	339		330	380	.0578	21.96		
	Substation	10	1,016		1,016	1,138	.0913	103.90		103.90
	Building								4.20	4.20
St. Croix rural—										
	Central office	12	51		51	57	.0746	4.26		4.26
		10	867		867	971	.0913	88.65		
	Wire	12	3,396	117	3,279	3,672	.0746	273.93		541.24
	Plant	15	2,760		2,760	3,091	.0578	178.66		
	Substation	10	1,707		1,707	1,912	.0913	174.57		174.57
	Building								.67	.67
Foreign rural—										
	Central office	12	110		110	123	.0746	9.18		9.18
		10	95		95	106	.0913	9.68		
	Wire	12	188	118	70	78	.0746	5.82		33.88
	Plant	15	284		284	318	.0578	18.38		
	Building								1.34	1.34
	General office equipment	7	434		434	486	.1345	65.37	19.71	85.08
	Building	60	5,000		5,000	5,600	.0088	49.28	49.28	

*Add 12 per cent. to cover engineering, superintendence, interest during construction, contingencies, etc.

Table No. 7. Depreciation Allocation to Different Classes of Service.

Classes of Service.	Classes of Equipment.	Present Values from Valuation.	*Add 12 Per Cent. of Present Value.	Apportionment to Classes of Equipment of Building and Land Investment.	Totals.	Percentage of Total.	Interest on Fair Value of Property Apportioned to Classes.
Toll				$1,243	$1,243	5.06	$106.26
Residence—							
	Central office	$ 913	$1,023	1,702	2,725	11.08	232.68
	Wire plant	5,300	5,936		5,936	24.16	507.36
	Substation	1,851	2,073		2,073	6.44	177.24
Business—							
	Central office	284	318		848	3.45	72.45
	Wire plant	792	887		887	3.60	75.60
	Substation	553	619		619	2.52	52.92
St. Croix rural—							
	Central office	40	45	85	130	0.53	11.13
	Wire plant	5,232	5,859		5,859	23.85	500.64
	Substation	788	883		883	3.59	75.39
Foreign rural—							
	Central office	86	96	169	265	1.08	22.68
	Wire plant	330	370		370	1.51	31.71
	Substation						
	Central office equipment	225	252	2,487	2,739	11.14	233.94
Miscellaneous—							
	Building	5,000	5,600				
	Land	550	616				
Total					$24,577	100.00	$2,100.00

*Add 12 per cent. to cover engineering, superintendence during construction, contingencies, etc.

Table No. 8. Interest Allocation to the Different Classes of Service.

A fair value of the property is set at $30,000. Interest at 7 per cent. on this amount gives $2,100. The interest apportionments appearing in the last column in the table No. 8 are transferred directly to the summary of the first apportionment, Table No. 9. This statement applies to all interest charges except interest on General Office Equipment and the "General Office" portion of the buildings, which expense will be considered under the heading "General Expense" and will be apportioned as an overhead charge in the summary of the Second Apportionment.

GENERAL AND MISCELLANEOUS EXPENSE.

The remaining expenses incident to the operation of the plant consist of general office salaries, miscellaneous expense, general equipment expense, and undistributed expense. This group will be apportioned to the various classes of service as an overhead in the "Second Apportionment."

In Table No. 9 are summarized all first apportionments of expense and these apportionments are also grouped preparatory to the second apportionment.

(To be Continued)

Groups of Expense Items.	Toll.	Residence.	Business.	St. Croix Rural.	Foreign Rural.	Total.
Group No. 1 —						
Central office operators' salaries	$748.60			$1,516.29		$2,264.89
Commercial	207.88	$146.02	$ 44.25	$ 26.55	$ 4.42	429.12
Group No. 2—						
Central office supervisory expense	39.61	112.00	36.58	50.82	99.38	338.29
Central office maintenance	4.48	32.32	13.87	7.37	12.86	70.90
Depreciation of central office equipment		97.51	30.81	4.26	9.18	141.76
Interest on central office portion of building fixtures and equipment	106.26	232.68	72.45	11.33	22.68	445.40
Depreciation on building (portion)	9.86	13.50	4.20	.67	1.34	29.57
Wire plant expense		173.66	25.73	421.27	22.51	643.19
Wire plant depreciation		311.95	42.47	541.24	33.83	929.54
Wire plant interest		507.96	75.60	500.64	22.68	1,106.28
Sub-total	$160.21	$1,481.00	$301.71	$1,537.60	$224.51	$3,705.03
Group No. 3—						
Substation expense		493.59	146.01	272.72		912.32
Substation depreciation		347.85	103.90	174.57		626.32
Interest on substation		177.25	52.92	75.39		305.56
Sub-total		$1,018.69	$302.83	$522.68		$1,844.20
Group No. 4—						
Miscellaneous general expense						$ 155.44
General office salaries						724.04
Undistributed expense						146.64
Depreciation central office equipment						65.37
Depreciation on building (portion)						19.71
Interest (chargeable to central office)						233.94
Sub-total						$1,345.14
Total expense						$9,588.38

Table No. 9. Summary of the First Apportionment by Groups.

New Operating Schedule.

Eight-hour days, six-day weeks and an increase in wages for the time employed, amounting to more than 16 per cent., are some of the benefits just given to operators of the Fayette Home Telephone Co., Lexington, Ky., according to announcement made by the company. The new schedule is effective January 1, and was prepared after intermittent labors of 18 months by Miss Katherine Krieger, chief operator for the company. Announcement is made, over the names of the executive committee, and reads, in part, as follows:

About 18 months ago the company, in a public statement, promised its operators that just as soon as a sufficient number of trained operators could be obtained, one day in seven would be given to each as a day of rest. The exchange necessarily runs for the full 24 hours on Sunday, just as it does on week days, and this Sunday work cannot be avoided. Under the new schedule the operators will be required to work two Sundays in each month, but each operator who works on Sunday will be given a week day of that week as a holiday.

The company has gone even further than it promised, for, under this new schedule, the working hours are cut down from nine, which is authorized by the Kentucky statutes, to eight hours per day. Under the present schedule, operators on duty nine hours a day and two Sundays per month, work 246 hours in a 30-day month. Under the new schedule, working eight hours a day and having one day's rest in seven, the operators will be required to work only 206 hours in a month of 30 days. The wages of all grades of operators have been increased, so that for the shorter hours they will receive practically the same amount at the end of each month. The number of working hours has been decreased between 16 and 17 per cent., and the operators' wages per day have been increased over 16 per cent.

The company is endeavoring to make the periods of labor performed by the operators conform to the modern efficiency theory; that is, to give the operators full work up to the point they begin to become tired, then give sufficient rest to build up the exhausted tissues. Under this schedule it is proposed that the operators work two hours, then have complete rest of 15 minutes; work for an hour and three-quarters, then a complete rest of an hour or two hours, and then work for two hours with a rest of 15 minutes, winding up the day with an hour and three-quarter's work. The company pays the operators for eight hours' work, but only requires of them 7½ hours of actual work.

Telephone Expansion in Seville, Spain.

Permission has been granted for the extension of telephone lines of Seville, Spain, to 22 towns. Some of the towns are said to be petitioning for immediate connections, while others are waiting until proper financial arrangements can be made. The first line will probably be installed between Seville and Guillena, as this latter is one of the towns that has a considerable daily commerce with Seville.

Proceedings Before Commissions, Courts and Councils

Discussions and Rulings of State Bodies Having Supervision Over Telephone Companies, Decisions of Courts in Matters of Interest to Public Utilities and Actions of City Councils Relative to Franchises, Rates and Service

Message Registers More Accurate Than Electric and Gas.

The New York Public Service Commission, in an opinion by Commissioner James O. Carr, has dismissed a complaint of the Ostro Detective Bureau, of New York City, which alleged that the New York Telephone Co. had charged it for more calls than it had made from its telephone, 7762 Cortland. In Commissioner Carr's opinion, though he finds that the commission has not the jurisdiction to settle the disputed question of fact, as to the exact number of calls made, he says that the system of the company for counting calls is as perfect as seems possible to devise. In view of the fact that the counting of the calls by the company is in the hands of one skilled and highly trained operator, while many persons, some of them not even in the complainant's employ and few of them expert with the telephone or primarily concerned with its operation, counted the calls for the subscriber, all the evidence tends to show that the telephone company's count is correct. Of the accuracy of the company's counting system, the opinion says:

> The message registers are operated electrically, and, from the evidence in this case, they are much more accurate than the standard meters in use generally throughout the country for measuring gas and electric curent. The evidence showed that the percentage of error in the message register was considerably less than 1 per cent.
>
> We do not wish to be understood as holding that no errors are made by the respondent in recording the number of messages used by a subscriber in Manhattan, because there are occasions when an error might be made against the subscriber without fault on the part of either the subscriber or the company. This was clearly brought out at the hearing. It is the fact, however, that in view of the manner in which the respondent handles its business it is very probable that the percentage of errors which are made in this way is very small.

Mr. Carr says that the company is now installing an improvement on its counting device, which will automatically prevent the recording of the same message more than once. He also finds that there was no evidence of the discrimination complained of, submitted by the complainant, and that the company showed that he was treated in the same way as its other subscribers of the same class.

To Determine Validity of Wisconsin Connection Law.

The first test case taken to the supreme court to determine the validity of the Wisconsin physical connection law passed by the 1911 legislature was heard on December 8. This case was instituted by the Wisconsin Telephone Co. against Frank Winter, the Wisconsin Railroad Commission and the La Crosse Telephone Co.

Frank Winter, one of the defendants, in the spring of 1913 successfully fought the action to cause the enforcement of the physical connection law in La Crosse through the railroad commission and the circuit court of Dane county.

Miller, Mack & Fairchild, Milwaukee attorneys for the Wisconsin Telephone Co., and special counsel of the Bell company from Boston and Chicago conducted the hearing in behalf of the corporation.

La Crosse patrons of either telephone company have been able to use the long distance lines of the other company for nearly two years as a result of the railroad commission ordering the installation of connecting lines there, on application of Mr. Winter. Subsequently the circuit court of Dane county upheld the order of the commission. Then the Wisconsin Telephone Co. appealed to the supreme court attacking the constitutionality of the physical connection law and maintaining further that the order was unreasonable.

The question of rates is not involved in this appeal. Under the order of the railroad commission the two local companies divided the expense of installing the connecting lines at La Crosse.

Applicant for Service Need Not Purchase Stock.

In a ruling handed down recently, the Wisconsin Railroad Commission ordered the Superior Rural Telephone Co., operating as a mutual company in the vicinity of Superior, Wis., to extend service to Clarence Carroll and to desist from the practice of compelling applicants for service to take stock in the company.

It was alleged that the mutual company refused to extend service to an applicant unless he first became a subscriber to the company's stock. The complaint filed with the commission thus raised the question as to whether or not the company can compel an applicant for service to became a stockholder in the company.

In its opinion the commission says: "The commission has never issued a formal ruling on this question, but has informally expressed the opinion in correspondence that such a requirement is not a reasonable one. A mutual telephone company which serves its own stockholders exclusively may nevertheless be a public utility within the meaning of the public utility law.

"For example, if a mutual company should number among its stockholders all except one or two of the inhabitants of an isolated valley, and should refuse to serve such non-stockholders, they would not be able to secure service from any source unless the mutual company could be compelled to extend its service to them. No outside telephone utility could be required to enter such a field for the service of one or two patrons. Whenever a mutual telephone company is so located in a community that residents cannot secure any reasonable telephone service except through it, the business is of a public nature and the mutual company is a public utility." . . .

This was found to be the situation in the present case.

"A public utility is required by law to render adequate service at reasonable rates. A customer may be charged a rate sufficient to provide a reasonable return for the utility, but he cannot be required to share in the undertaking. The ownership of stock in this company makes a person liable to assessment if the revenue is insufficient or if unforeseen contingencies arise, and entitles him to share in any profits of the enterprise. The assumption of the responsibilities of a stockholder, however, is purely optional with the consumer, and cannot be forced upon him as a condition procedent to receiving service."

The company was accordingly ordered to extend service to the complainant and to desist from its practice to requiring applicants for service to purchase stock in the company.

Lower Rate Schedule for District of Columbia.

The Chesapeake & Potomac Telephone Co. has filed with the public utilities commission a revised schedule of telephone rates for the District of Columbia, which, it is said,

represents a saving to telephone users of $105,000 per year.

The principal changes affect business houses, hotels and commercial establishments having private branches, although persons having two-party line service also receive benefits from the readjustment. The rate for local messages over private branch exchanges will hereafter be 2 cents each, instead of 2½ cents, provided the total number of messages is more than 200.

Another important item to business men is a reduction in the cost of connecting telephones with private branches. Heretofore the monthly charge has been 50 cents flat for each telephone connected with the exchange. In the future the 50-cent charge will apply only to the first ten telephones. For the second ten the charge will be 40 cents a month, and for all over 20 the rate will be 30 cents.

The two-party business rate of $2.50 a month will remain stationary, but the allowance of messages has been increased from 30 to 40 calls a month, with a charge of 5 cents each for all messages over 40, and with the privilege of an annual adjustment on the basis of 480 messages as a minimum. Under this arrangement subscribers to two-party business service may use their telephones more than 40 times during some months and less during others, provided the total aggregates at least 480 during the year.

The two-party residence rate has been reduced from $2.50 a month to $2, with the right to send 30 messages a month and payment of 5 cents each for additional messages.

Commission's Valuation of Lima Company Protested.

The Lima Telephone & Telegraph Co., of Lima, Ohio, has filed a protest with the Ohio Public Utilities Commission on the basis of valuation of its properties, as fixed by the commission's appraisers.

The valuation, as fixed by the telephone company, shows a much higher figure than the one submitted to the commission by its telephone expert. The company placed the cost of replacing the old equipment with new material at $904,727, while the commission places it at $831,542, a difference of $73,185.

The difference in valuation was made in the manner of the taking of the inventory, one item of the commission crediting the company with $13,000 more than did the company's engineer, while the protesters believe that $13,000 used in the managerial expenses during the construction should be placed on the capital account, thereby increasing the value of the plant by that sum.

Ohio Mutual Company Enjoined from Operating.

In the case of the Local Telephone Co. vs the Cranberry Mutual Telephone Co., Judge Daniel Babst, of the circuit court of Bucyrus, Ohio, ordered that the injunction prayed for by the plantiff be made perpetual. On August 31 the Local Telephone Co., which operates in and about New Washington, secured a temporary injunction against the mutual company, on the ground that it had not secured authority from the commission to establish its lines. This injunction is now made permanent, unless repealed by higher court.

Hearing on Telephone Investigation in Washington.

The Washington Public Service Commission will hold a hearing, on January 24, on a state-wide investigation of the Pacific Telephone & Telegraph Co., with a view to determining the reasonableness of the company's rates. At this hearing the physical valuation figures obtained by the commission's field engineers during the past year will be used together with the company's figures, in an effort to determine the fair value of the plant. All rates of the company will be up for hearing as to their fairness, including long distance rates and rates charged by the 116 local exchanges.

One of the questions to come up for determination by the commission at this hearing is the question of where toll service commences and exchange service ends. At present a five-cent terminal charge is credited to the local exchange for conducting the toll business, or long distance service, and the propriety of this charge will come up for determination.

Wants New Franchise Before Improving Plant.

The town council of Versailles, Ky., is considering the draft of a franchise which has been presented on behalf of the Fayette Home Telephone Co., which, though operating there, is without the franchise privileges. According to a communication from George H. Shanklin, president of the telephone company, the system in Versailles, in order that adequate service be given, needs improvements which will cost approximately $15,000. The company is not willing to make the improvements on the basis on which the business is at present conducted, and is asking for a 20-year franchise to justify the needed improvements.

New Schedule of Rates for Footville, Wis.

In a ruling handed down December 16, the Wisconsin Railroad Commission authorized the Footville Telephone Co., of Footville, Wis., to put into effect the following schedule of rates:

One party business telephones	$18 per year.
Two party business telephones	15 per year.
One party residence telephones	15 per year.
Two party residence telephones	12 per year.
Rural telephones	15 per year.

A penalty of 20 cents per quarter for failure to pay bills within 30 days after the end of the quarter is permitted.

To Test Right to Set Aside Franchise in Oregon.

The city council, of Woodburn, Ore., has instructed City Attorney Blaine McCord to bring action to restrain the Western Telephone Co. from raising telephone rates over those specified in the franchise granted the company by the city on October 4, 1910. The monthly maximum rates in the franchise agreement are $1.50 for a single party line, $1.25 for a two-party line and $1 for more than two.

The public service commission recently granted the company permission to raise the rates over the franchise maximum rates. The principle involved is the authority of the commission to trespass on municipal franchise premises.

Brief Filed in Milwaukee Rate Case.

Miller, Mack & Fairchild, attorneys representing the Wisconsin Telephone Co., in the inquiry on telephone rates in the city of Milwaukee before the Wisconsin Railroad Commission, have filed their brief in the case. Assistant City Attorney Max Schoetz, who is counsel for the petitioners with E. B. Hibbard, says that the decision in the case is expected soon and he expresses the belief that it will be for lower rates.

Proposed Merger of Telephone Properties in Michigan.

Early in December a joint petition was filed with the Michigan Railroad Commission by the United Home Telephone Co., of Muskegon, and the Michigan State Telephone Co., for an almost complete interchange of properties in Ottawa, Newaygo, Muskegon, Lake, Manistee, Oceana and Mason counties. A hearing was held by the railroad commission in regard to the application on December 16.

Sale of York State to Bell Company.

The physical properties and existing contracts of the York State Telephone Co. were recently sold at a mortgage foreclosure sale for a little more than $800,000 to the New York Telephone Co. The properties consist of the ex-

changes and plants in Binghamton, Lestershire, Union, Elmira, Elmira Heights, Horseheads, and the long distance lines between Binghamton and Elmira.

Right of Commission to Prohibit Duplication.

The Nebraska supreme court has advanced the case of the Lincoln Telephone & Telegraph Co. vs. the Sterling Telephone Co. for hearing at the session beginning February 7. The question involved is the right of the railway commission to prohibit the duplication of public utilities in fields already adequately served.

Increase in Rates Authorized at Northfield, Wis.

The Wisconsin Railroad Commission on December 16, granted permission to the Northfield Farmers' Telephone Co., of Northfield, Wis., to increase its rates from 75 cents a month to $1 a month. These rates are fixed so as to become effective October 1, last.

Telephone Consolidation at Ennis, Texas.

The Texas Telephone Co., of Waco, Texas, announces the purchase by that company of the properties of the Southwestern Telegraph & Telephone Co. at Ennis. This makes the seventh consolidation effected by the Texas company since May 1 of this year.

Injury of Lineman.

A telephone lineman brought action for injuries in falling from a pole because the snap in his safety belt became unfastened. An instruction that if defects in appliances are known to the employe or are discoverable by him with ordinary care, and he remains in the employment without protest and without inducement by promises of repair, he will be presumed to have waived his objections and to find for plaintiff if he was not guilty of contributory negligence if the snaps and rings on the belt were defective if plaintiff did not and could not by using reasonable care have known of such defects, and if the risk was not assumed as incident to plaintiff's employment, constituted error in failing to take into consideration the Iowa Code Supplement, 1913, 4,999—a3 (Acts of 33d General Assembly, chapter 219).

This code provides that in all cases where machinery or appliances are defective, and, where it is the employer's duty to furnish reasonably safe appliances, the employe shall not be deemed to have assumed the risk by continuing in the work, and that the employe shall not be deemed to have waived the employer's negligence unless the danger be imminent and to such an extent that a reasonably prudent person would not have continued in the prosecution of the work, the safety belt being an appliance, and it not being claimed that the danger was imminent or to such an extent that a reasonably prudent person would have continued in the prosecution of the work. Boone vs. Lohr, Supreme Court of Iowa, 154 Northwestern, 591.

Iowa Statute Governing Franchises.

An Iowa telephone company was granted and accepted a franchise to operate its lines under Code 1873, section 1324, as amended by acts of the 19th General Assembly, chapter 104 (Code 1897, section 2,158), providing that any person or company may construct a telegraph or telephone line along the public highways of the state or across the rivers or over any lands belonging to the state or to any private individual, and may erect the necessary fixtures therefor. Code 1897, section 775, provides that cities and towns shall have the power to authorize and regulate telegraph, district telegraph, telephone, street railway, and other electric wires, and the poles and other supports thereof, by general and uniform regulations, and to provide the manner in which and places where the same shall be placed upon, along, or under the street, roads, avenues, alleys, and public places of such city or town, and may divide the city into districts for that purpose.

Section 776 provides that no franchise shall be granted, renewed or extended by any city or town for the use of the streets, highways, avenues, alleys, or public places, for any of the purposes named in the preceding section, unless a majority of the legal electors voting thereon vote in favor of the same at a general or special election. The council may order the question of granting, renewal or extension of any franchise submitted to a vote at a general election, or at one specially called for that purpose, or the mayor shall submit such question to such vote upon the petition of 25 property owners of each ward in a city, or 50 property owners in any incorporated town.

The court held that such sections did not deprive the telephone company of its franchise to operate its lines in a city, and thus impair the obligation of its contract, and deprive it of property without due process of law. The object of such legislation, it held, was to authorize cities to regulate such companies as were already using the streets and alleys under the grant of the legislature and others which might secure such right by general and uniform legislation applicable to all, and to provide that no such franchises should thereafter be granted, renewed, or extended, except upon a referendum vote. State vs. Iowa Telephone Co., Supreme Court of Iowa, 154 Northwestern, 678.

Acceptance of Franchise from City.

The city of Keokuk, Iowa, passed an ordinance granting to the W. Telephone Co. for 10 years the right to operate and use a system of telephones, prescribing the manner in which the wires and poles should be placed and other conditions, and the ordinance was accepted by the company and the system installed. The C. Telephone Co. having acquired the rights of the W. Telephone Co., the city passed an ordinance granting it a 10-year franchise, also specifying the manner in which the streets should be used; such ordinance being accepted by the C. company. Thereafter the I. Telephone Co. purchased all the property rights of the C. company in the city, including the privileges under the ordinances. The city passed an ordinance requiring that all telephone companies, as a condition precedent to maintaining their lines in its streets, should procure a franchise from the city.

The I. company derived its right to use the streets from an occupation thereunder by virtue of a state statute, so that the attempted regulation by the city was ineffectual; but the city claimed that the acceptance of prior ordinances by the I. company's predecessors estopped it to deny the city's power and to claim rights under the state law. The court held that such acceptances were inoperative as an estoppel, since, when the city assumed to grant franchises to the telephone companies, it had no such power—that authority being vested in the state. Iowa Telephone Co. vs. City of Keokuk, United States District Court of Iowa, 226 Federal, 82.

Injury to Employe.

Where, in a lineman's action for injuries due to the falling of a telephone pole while he, under the directions of the foreman, was removing wires from the cross arms, the evidence showed that the pole was decayed at the base, and had been in use for 10 or 15 years, and there was no evidence when, if ever, the pole had been inspected, or evidence to show a customary method of inspection, or that defendant had any rule relating thereto, or had attempted to keep its poles in proper repair, and it appearing that plaintiff did not know and was not chargeable with knowledge of the defect, the case was for the jury. The court held that where a lineman was injured from the breaking and falling of a pole decayed at the base, when a fellow workman of plaintiff cut the wires, the

proximate cause of the injury was the breaking of the pole in consequence of its decayed condition, and not the act of the fellow workman. O'Donnell vs. Bell Telephone Co., Supreme Court of Pennsylvania, 95 Atlantic, 579.

Summary of State Commission Hearings and Rulings.

COLORADO.

December 31: Hearing on petition of 50 citizens of Flagler, Colo., for an order requiring the Mountain States Telephone & Telegraph Co. to extend its lines to connect six towns east of Denver, namely, Bovina, Seibert, Stratton, Vena, Flagler and Burlington.

DISTRICT OF COLUMBIA.

December: The Chesapeake & Potomac Telephone Co. filed a revised schedule of rates for the District of Columbia representing a saving to telephone users of $150,000 per year.

ILLINOIS.

December: Petitions filed by the Decatur (Ill.) Home Telephone Co. for permission to sell and the Central Union Telephone Co. for permission to buy, the properties of the Decatur Home company in Decatur.

December 16: Agreement between the receivers of the Central Union Telephone Co., and the Central Illinois Telephone & Telegraph Co., of Lincoln, to operate their lines in connection with each other, approved.

December 16: In the case of B. L. Huey and 34 other residents of the West Side of Dix township, Ford county, vs. the Gibson Home Telephone Co., of Gibson, and the Dix Telephone Co., of Elliott, the commission ruled that the Dix company must provide an additional trunk line between Elliott and Gibson City for handling inter-company calls and repair and improve the plant within a period of four months. The complainants alleged that the two companies had entered an agreement making the township line the dividing point of their territories and that this worked to the disadvantage of subscribers.

December 16: Permission granted the Chenoa (Ill.) Telephone Co., to change rates and discontinue discriminatory charges.

December 20: Further hearing in Chicago in the case of Adam S. Clow, et al., committee of the Interstate Telephone & Telegraph Co., and the Atlantic & Pacific Telephone & Telegraph Co., for an order approving the sale of the Interstate company to the Atlantic company.

INDIANA.

December 11: Application filed by the Farmers Co-operative Telephone Co. for permission to sell its plant to the Consolidated Telephone Co., of the same county.

December 20: Postponed hearing of complaints of subscribers of the Citizens Telephone Co., of Columbus, Ind.

KANSAS.

December 16: Application filed by the Citizens Telephone Co., of Republic, Kan., for permission to increase its rates from $1 per month to $1.10 a month for wall telephones and $1.35 for desk telephones, all bills paid before the 15th of the month to be allowed a 10 per cent. discount.

MICHIGAN.

December 15: Hearing in the case of S. B. Schurtz vs. the Michigan State Telephone Co. and the Citizens Telephone Co. to compel the two companies to make physical connections in Grand Rapids.

December 16: Hearing on application filed by the United Home Telephone Co., of Muskegon, and the Michigan State Telephone Co. for the interchange of properties in Ottawa, Newaygo, Muskegon, Lake, Manistee, Oceana and Mason counties.

January 12: Continued hearing on application of the Michigan State Telephone Co. for permission to increase its rates at Detroit.

MINNESOTA.

December 14: The Zenith Telephone Co., of Duluth, Minn., surrendered its franchise and asked to be given an indeterminate permit to operate in the city of Duluth.

MISSOURI.

December 16: The commission granted permission for the transfer of the property of the Elmer Telephone Co., Elmer, Mo., from T. L. Freed and F. L. Mixon, to A. F. Smith and J. O. Atteberry, of Elmer, for a consideration of $6,684.

December 16: Application filed for the transfer of the property of the Green Ridge Telephone Co., Green Ridge, Mo., from J. J. Steele to C. F. Tonn and J. E. Tonn., for a consideration of $3,725.

January 22: Continued hearing in the matter of the application of the Kansas City Southern Railway Co., asking that the commission adopt uniform rules and regulations governing the construction of telephone, telegraph and other electrical signaling wires over the tracks and rights of way of railroad companies in the state. A committee has been appointed, composed of members of the different wire using companies, with Commissioner Howard B. Shaw, as chairman, to secure data and draft a set of proposed specifications for the instructions.

NEBRASKA.

December: Petition filed by the Northern Antelope Telephone Co., of Neligh, Neb., for permission to issue $5,000 additional capital stock for the purpose of paying for certain notes.

December: The commission authorized the Calloway & Arnold Telephone Co., of Calloway, Neb., to issue $2,750 worth of capital stock to pay three notes amounting to $2,100 and to reimburse stockholders for money advanced for new construction.

NEW HAMPSHIRE.

December 10: Hearing on proposed increase in rates by the Winnipesaukee Telephone Co. at Center Harbor and Meredith.

December 10: Hearing on proposed increase in commuted rates by the White Mountain Telephone & Telegraph Co. affecting Plymouth, Ashland, Littleton, Lisbon, New Hampton, Warren, Woodstock and a number of smaller towns.

NEW YORK.

December 21: The commission dismissed the complaint of the Ostro Detective Bureau of New York City which alleged that the New York Telephone Co. had charged it for an excessive number of calls. In its opinion the commission held that the message registers are much more accurate than the standard meters for measuring gas and electric current.

OHIO.

December 14: The Lima Telephone & Telegraph Co. filed a protest on the basis of valuation of its properties as fixed by the telephone experts of the Ohio Public Utilities Commission.

OKLAHOMA.

December 11: At the hearing on the complaint of the subscribers of the Pioneer Telephone & Telegraph Co., at Ardmore, Okla., it was stated by the company's attorneys that it was planning to make the needed repairs. The commission therefore gave the company 30 days to improve service before proceeding upon the complaint.

PENNSYLVANIA.

December 20: Continued hearing of complaints of the city of Pittsburgh, Pa., and the Chamber of Commerce against the rates of the Central District Telephone Co. in Pittsburgh.

VIRGINIA.

December 8: Chesapeake & Potomac Telephone Co. authorized to advance its rates to subscribers within the city limits at Newport News, Va., from $36 a year to $42 for two party service.

WASHINGTON.

January 24: Hearing on state-wide investigation of the Pacific Telephone & Telegraph Co. with a view to determining the reasonableness of the company's rates, both local and long distance. At this hearing the figures obtained by the commission's field engineers during the past year will be used together with the company's figures in an effort to determine the fair value of the plant.

WISCONSIN.

December 11: The commission dismissed the petition of the Red Oak Telephone Co., of Boyd, Wis., for authority to extend its lines into the town of Delmar, Chippewa county, because the building of the line would result in a duplication of a line of the Cadott Telephone Co.

December 16: Hearing at Winter, Wis., in re investigation on motion of the commission, in respect to inadequacy of the service of the Rice Lake & Northeastern Telephone Co. U—852.

December 16: Hearing in the case of the Farmers Inter-County Mutual Telephone Co. vs. the Mauston Electric Service Co., in regard to connection. U—857.

December 16: The commission granted the petition of the Northfield (Wis.) Farmers Telephone Co. for permission to increase its rates from 75 cents a month to $1 a month. These rates are fixed so as to become effective October 1, last.

December 16: The commission authorized the Footville (Wis.) Telephone Co. to put into effect the following rates: One-party business telephones, $18 per year; two-party business telephone, $15 per year; one-party residence, $15 per year; two-party residence, $12 per year; and rural telephones, $15 per year. A penalty of 20 cents per quarter for failure to pay bills within 30 days after the end of the quarter is permitted.

Practical Subjects—Letters and Discussions

Exchange Areas.

In the development of uniform accounting there is one phrase which is being used with increasing frequency. It is "Exchange Area." As the various commissions have time to get down to the more definite matters, they will be apt to insist more and more upon a definite geographical division of exchange areas.

Some two years ago, one of the district associations considered the use of the accompanying questions and diagram

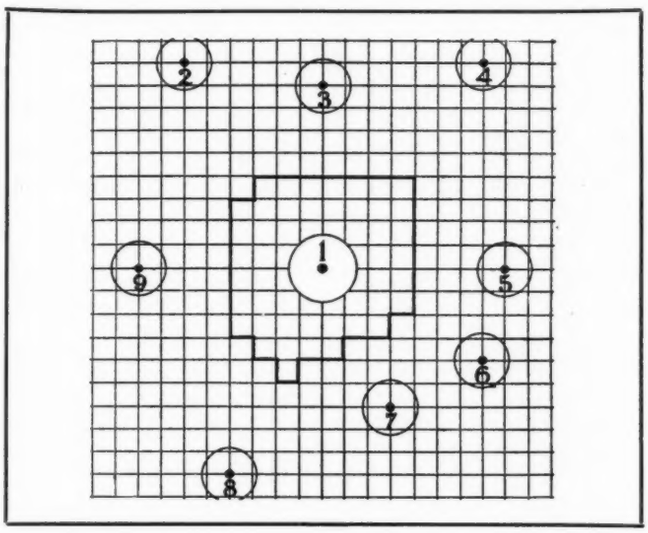


Chart Suggested for Showing Exchange Area Data.

for the purpose of straightening out the border lines between adjoining exchange areas. Space was left opposite each question for filling in the answer.

I.

Would it be advantageous for the public, for the consumer and for the producer of (service or telephone) *communication* to have an agreement or an understanding about a dividing line between the area of each telephone exchange and the area of every adjoining exchange? *To have an understanding as to the boundary lines of each telephone exchange area as we now have about the lines which separate each township from every adjoining township?*

II.

Do I know exactly how many telephone exchange areas *touch or adjoin the area of the exchange with which I am associated?*

III.

Do I know the name or names of the man or men who decide the most important matters which from time to time confront the exchange or company which operates in each of these several adjoining areas?

IV.

The map or chart which appears herewith has been made to show the method of using a corresponding larger chart.

In the center of this chart is a county seat town numbered "1." Around it is shown the exact relative geographical location of the seven towns and villages whose exchange areas touch the area of the county seat exchange.

Would it be beneficial for the public that is served by the exchange with which I am associated if I were to *put on paper* the following:

(1) A circle, showing on the accompanying map or chart, the exact geographical location of every adjoining exchange "central"?

(2) Number each of these circles consecutively?

(3) A list showing the number as it appears on the map, the name of the town and the name of company, co-partnership or individual owning and operating the exchange in each?

(4) A continuous line indicating on the map the boundary between the exchange area with which I am associated and the areas of each and every adjoining exchange?

(5) The exact number of telephones in service in the exchange with which I am associated?

(6) The approximate number of telephones in use in the exchange which serves each of the adjoining areas?

(7) A set of figures showing separately the number of business telephones, the number of town residence telephones, the number of rural *rented* telephones and the number of switched or mutual rural telephones, for the exchange with which I am associated?

(8) A similar set of figures for each and every adjoining exchange?

(9) The rate per year, or month, charged or "assessed" for service or telephone communication, for each of the above mentioned classes—first for the exchange with which I am associated?

(10) And then for the exchange which is operating in each of the adjoining areas?

(11) The extent of the territory that is included in the flat-rate privilege enjoyed by any or all of the various classes of patrons in the exchange with which I am associated?

(12) And then the same data in the exchange of each of the adjoining areas?

(13) Under a class of information to be designated as remarks, would it not be well for me to put down on paper such other items of information concerning each of these exchanges as would help me, as a telephone expert, in the discharge of my duties to the public?

(14) Has the public a right to hold some one responsible for keeping himself posted along any one or more of the lines of information indicated by the foregoing?

Earth Resistance and Electrolysis.

There has just been issued by the United States Bureau of Standards, of the Department of Commerce, a paper dealing with the factors which influence the resistivity of the soil and with the effects of soil resistance on the leakage of currents from street railway lines using the rails as return conductors. Three methods of determining the specific resistance of soil are given and the results of a large number of measurements are tabulated.

The principal factors which influence soil resistance are described and their effects on the results of electrolysis surveys and on the escape of currents from street railway tracks are discussed.

Copies of the publication, Technologic Paper No. 26, entitled "Earth Resistance and Its Relation to the Electrolysis of Underground Structures," may be obtained free of charge upon application to the Bureau of Standards, Washington, D. C.

Coming Conventions of A. I. E. E.

At the December meeting of the board of directors of the American Institute of Electrical Engineers, it was decided to hold the usual midwinter convention in New York City, February 8-9, 1916.

At the same meeting, a Pacific Coast convention, to be held in Seattle, Wash., under the auspices of the Seattle section of the Institute, was authorized.

South Dakota Independents Gather in Annual Session

Convention of South Dakota Independent Telephone Association Marked by Lively Interest in Papers and Discussions and also in Manufacturers' Exhibits—Addresses by Members of Railroad Commission, Governor F. M. Byrne and Others—Report of Proceedings

The thirteenth annual convention of the South Dakota Independent Telephone Association, held at the Cataract Hotel, Sioux Falls, S. D., December 15 and 16, was marked by the interest taken in the papers and discussions. In addition to a large representation of Independent telephone companies in the state, a number of telephone manufacturers and supply dealers were represented with exhibits. The morning was taken up with registrations, applications for membership and getting acquainted.

The convention proper opened at 2 o'clock in the afternoon, Secretary T. M. Gibbs, of the Sioux Falls Commercial Club, making the address of welcome on behalf of the city. C. B. Kennedy, of the Canton (S. D.) Co-operative Telephone Co., made an apt response on behalf of the association.

In his annual address President J. A. Steninger spoke at some length of the work and problems of the association.

"While en route from Washington, D. C.," he said, "to Chicago last Thursday to attend the joint convention of the two national associations, I read in a Pittsburgh paper that the object of said association had been attained, viz.: The uniting of the two associations into that of the United States Independent Telephone Association. This was a result for which many of us no doubt had practically been praying for some time, for, quoting TELEPHONY, 'with the combination of the two great national associations, telephone troubles of a national character will be more thoroughly worked out, without so much division of opinion, and the new national body should have the support of all telephone men.'"

In closing President Steninger touched upon the necessity for co-operation, urging the members to make known any suggestions which they may have for the good of the association, or that will assist them in their duties to the association.

The balance of the afternoon was taken up with a discussion of resolutions and the appointment of committees.

THURSDAY MORNING SESSION.

The Thurday morning session was opened by Chairman J. J. Murphy, of the South Dakota Railroad Commission, and L. R. Bitney, statistician for the commission, both of whom touched directly upon phases of the control and operation of Independent telephone exchanges in the state of vital interest to those present. Mr. Murphy discussed particularly the need for co-operation between exchanges in the small towns with the rural lines, and expressed the belief that the relations between the commission and the companies should be those of an amicable understanding with a view to obtaining such co-operation and improvement of the state-wide service.

The opening address at the afternoon session was made by Governor F. M. Byrne, who spoke on the subject of "The Relations of Public Service Corporations to the Public." In his remarks he made it plain that he believed in government control of such corporations.

"The corporation that follows this business is a public corporation," he said, "and the man that runs it is a public servant. That suggests that in these days of complicated business matters man is becoming more and more the servant of his fellow man, and this in turn suggests responsibility to the public. Public control is no longer debatable; it is only a question of method. The telephone is by nature a monopoly, and cannot be regulated by competition, as store trade, for instance."

In concluding the governor said: "I'm sure it is the desire of the railroad commissioners to be helpful to the telephone companies. I have always been an advocate of public control—not for the purpose of forcing down rates, but for the purpose of encouragement and helpfulness, better service and fair returns."

H. P. Hartwell, who was to have reported on legislation and taxes, was not present. Frank C. Builta spoke on the subject of "Publicity and the Public," after which J. Van Vliet gave a talk upon "Auditing for the Smaller Companies."

"Collections" is the title of a paper presented by J. Wilson.

ELECTION OF OFFICERS.

The following officers were elected for the ensuing year: President, J. A. Steninger, Parker; vice-president, H. P. Hartwell, Irene; secretary-treasurer, A. S. Hall, Redfield. The officers together with the following constitute the executive committee: J. Wilson, Groton; J. W. Miller and Theo. Burndt, of Avon; R. E. Cameron, White, S. D.

Aberdeen was chosen as the place for the next annual meeting of the association.

In the resolutions adopted at the closing session it was recommended that decisive steps be taken to increase the membership of the association, and, further, that

"Inasmuch as the business of the exchange companies and toll companies and the patrons of both are so closely related, we recommend that the members of this association cultivate a more friendly relationship or feeling than has been in the past, to the end that a better spirit of co-operation prevail, which we believe will be for the good of the service and best interests of all concerned."

The annual banquet was held at 6:15 Thursday evening at the Cataract Hotel. Following the banquet, the Sioux Falls Commercial Club entertained the members of the association at a theater party. This was the closing feature of the convention.

Among those present were the following:

A. S. Hall, Redfield; E. D. Vayo, of St. Paul, Minn.; B. H. Blake, Indianapolis, Ind.; B. A. Parsons, Fargo, N. D.; A. C. Ruble, Sioux City, Iowa; W. N. Curtis, Chicago; L. Q. Trumbull, Fort Dodge, Iowa; R. O. Palmer, Mankato, Minn.; J. M. Moore, Waterloo, Iowa; W. B. Crissman, Cleveland, Ohio; C. R. Sargent, Minneapolis, Minn.

J. A. Steninger, Parker; J. W. Miller, Flandreau; F. C. Robinson and J. Wilson, of Groton; H. A. Holden, of Watertown; Theodore Burndt, of Avon; R. C. Barnard, of Sioux Falls.

B. H. Merriman, of Omaha, Neb.; H. P. Hartwell, of Irene; Charles Conklin, of Conde; L. V. Schneider, of Salem; H. A. Schultz, Verdon; F. A. Patton, Artesian; C. B. Kennedy, Canton, S. D.

New Telephone Exchange at Washington, Iowa.

Work on the new exchange of the Washington Telephone Co., Washington, Iowa, is progressing rapidly. When the building is completed the company will install a new up-to-date switchboard with the latest automatic time and labor-saving features. About 1,600 telephones will be installed.

Fundamental Principles of the Telephone Business

A Reading Course Designed to Present Logically the Principles Which Underlie Successful Organization and Operation of Telephone Properties—Prepared Under the General Supervision of Stanley R. Edwards—Part I, Telephone Economics, by James H. Shoemaker, Completed June 26, 1915—Part II, The Corporate Telephone Organization, by J. C. Kelsey and S. R. Edwards, Completed September 25 Part III, Telephone Accounting and Auditing, Written by James H. Shoemaker

Quiz Questions on the Preceding Installment.

87. Give an answer to the question: Into how minute details can the keeping of cost be carried to advantage?

88. What is the object of securing unit costs of operation?

89. What two questions were asked managers of medium-sized companies in regard to cost accounting? Cite an instance of the use of cost accounting.

90. Outline a plan suggested for handling accounting problems of Class C companies.

91. What has been the author's purpose in dealing with cost accounting?

CHAPTER IX. Depreciation Reserve and Surplus.

92. *Questions Which Trouble Managers and Bookkeepers.*—Some questions which puzzle many managers and bookkeepers are these which follow:

How much of a depreciation reserve should my company have right now?

How can an account called "Reserve for Accrued Depreciation" be of any real value unless it represents cash actually on hand, in the bank or invested in some manner where it can be turned into cash immediately whenever needed?

What needs most to be done with the accounts of my company to remedy the mistake of paying for extensions out of profits?

What must my company do, hereafter, to comply with uniform accounting requirements—concerning depreciation and the account called "Reserve for Accrued Depreciation"?

How must I treat this account on the books and balance sheets?

What can best be done to remedy our former practice of merely "charging off" whatever seemed convenient—only as we happened to have a good "showing" of profits at various irregular periods?

To answer the foregoing questions, let us take a real case under the imaginary name of the Blackville Telephone Co.

93. *One Company's Capitalization Dividends and Depreciation Reserve.*—The Blackville Telephone Co. sold 500 shares of common stock for its face or par value of $100 a share. It put $50,000 of real money into the bank. It began business in 1899 with a plant which actually cost $50,000.

It has paid a dividend every year. Its highest dividend was at the end of the first year—10 per cent. Its lowest dividend was when its first construction was in its most expensive condition and when a sleet storm did considerable damage. That was the year 1907; and the dividend that year was only 4 per cent. But during the entire period of 16 years, this company has paid an average of 6 per cent. or a total of 96 per cent.

The thing which was perplexing its manager, however, was this: He had only $3,000 in his "Reserve for Accrued Depreciation," whereas, on a depreciation basis of 6 per cent. yearly, it might seem that he needed between $60,000 and $80,000. This $3,000 is the only figure he has ever carried on his books as a reserve for depreciation, and his plant should now be within eight months of the time when depreciation would make it valueless. In other words, on the basis of 6 per cent. yearly depreciation, the final end of a plant—its death, so to speak—comes in exactly 16⅔ years.

94. *Changes in Plant and in Capital Stock.*—But this Blackville company has not continued with just that original $50,000 worth of property which comprised the plant in the beginning. On the contrary it now has a plant which, according to the books, cost $150,000. And, between 1899 and 1908, this company sold additional stock (at par) to the amount of another $50,000—making its total capital $100,000.

Beside increasing its capital stock and increasing the plant, this company changed from grounded lines to common return, from common return to metallic open wire and from open wire to "all cable." The all cable plant, including new poles for practically every lead, is only one year old.

It is easy to understand, therefore, that there is no possibility of this property falling down at the end of 16 years and eight months.

95. *Dividends and Rates.*—One thing which happened to this company has happened to many other companies. The officers learned in time that when they were paying their highest dividends, their rates were, in reality, too low.

Finally, in the beginning of 1908, they raised every rate $3 a year. Since that time they have been able to keep the property up to standard and to pay 6 per cent. on the stock each year.

96. *Some Questions as to Handling the Depreciation Reserve on the Books.*—The manager of this company wanted to know just how to begin to "get right" concerning the total depreciation reserve which he should have; how to show it on his books and balance sheet and all the rest—without causing any extra work or expense.

He was asked if he knew of any way by which a bookkeeper could credit an item to "Reserve for Accrued Depreciation" every month (or twelve times a year) with as little cost of time or effort as to charge it off once a year. He was questioned as to whether he knew how the bookkeeper could debit ordinary repairs of various sorts twelve times a year and make corresponding credits to a depreciation reserve without using

more time and energy than when all such entries were ignored —never made at all.

Then he was asked who was going to "study up" on the printed instructions sent out by the commission and tell just how much of a credit should be made to general repairs to equalize the extraordinary repairs at the end of the month—if that were the method chosen—or who would post himself to the extent that he could decide properly from day to day and from hour to hour what materials, labor, etc., were going into ordinary repairs and what into extraordinary repairs.

He was helped to see that ordinary repairs are such as companies must make while they are "letting the plant run down," while extraordinary repairs are such repairs as are made over and above merely keeping the plant alive—such as are made to keep it constantly up to the best practical (standard) condition.

97. *The Division of Repairs into Ordinary and Extraordinary.*—The main point to be fixed firmly in mind is this: "Reserve for Accrued Depreciation" is a reservoir created in time of plenty to be drawn upon in time of need. That is why repairs must be divided into ordinary and extraordinary.

A repair which might be made either this month, or six months later, is an extraordinary repair. It should not be taken out of the net earnings of the month in which the money is paid out. It should be charged against the reserve for accrued depreciation. But to do this there must be a credit previously established in the account covering the reserve for depreciation.

98. *Distribution of Charges Over Certain Periods of Time.*—It is easy to credit to a tax account, every month, the amount which at the end of the year will take care of the payment made for taxes. Nearly every bookkeeper knows how that matter is handled for insurance and other matters, as well as for taxes. Some companies take out enough during every month of the year to make a monthly equalization of heat and light in order to avoid the decrease which would otherwise appear in the net earnings during the shorter and colder days of winter.

The depreciation reserve is handled in the same general way —so far as charging gross earnings is concerned and so far as crediting reserve for depreciation is concerned.

99. *Utilization of the Depreciation Reserve.*—In the case of the Blackville Telephone Co., $3,000 had been charged against gross earnings and credited to reserve in a single arbitrary allowance which had been made in January, 1915. It stood at exactly that same figure until November. The bookkeeper wanted to know how he was ever going to "get rid" of it before the time came for the next annual report to the officers and shareholders.

The manager was asked if his company had made no extraordinary repairs. It then developed that a change from local battery to common battery had recently been made at an expense of $16,000. There was $4,000 of salvage from the old telephones and switchboard.

The reproduction cost of the plant was advanced $8,000 and there was a balance of $4,000 which needed to be charged against depreciation reserve. This last-named item of $4,000 was being carried in a suspense account—waiting for light on the accounting problem.

The profit and loss or surplus account for the eleven months of the year, was $2,000 greater than needed for the payment of the usual 6 per cent. dividend.

The recommendation was made, therefore, that profit and loss (or surplus) should be debited $2,000 and a similar credit posted to "Reserve for Depreciation." Adding this to the $3,000 already in the "Reserve for Depreciation" would make a total of $5,000. Then the suspense account (the $4,000) could be closed by crediting it and debiting the depreciation reserve $4,000.

This would leave $1,000 in depreciation reserve for the end of the year. *(To be Continued)*

The Modern Seven League Boots.

The story of the daily operation of the telephone has been woven into an interesting moving picture, under the personal direction of H. N. Foster, traffic superintendent of the Chicago Telephone Co. While the purpose of the picture is to give to the outsider a comprehensive knowledge of the working of a telephone system, a suspended romance running through the films supplements the interest and adds the human touch.

The picture is entitled, "The Modern Seven League Boots." Ethele Warder, daughter of a wealthy family, is introduced in her California home. Her father loses his fortune and, confronted by the necessity of earning her living, Ethele finds employment as a telephone operator at the suggestion of her aunt. The film takes her through the class rooms, where telephone operators are trained in their duties at the switchboard, and through the operating rooms where the telephone calls are handled, giving an excellent idea of how a large telephone system is conducted.

The switchboard for outgoing calls in the company's new Hyde Park office in Chicago is shown in operation. This is said to be the longest stretch of telephone switchboard in any telephone exchange in the world, having positions for nearly 100 operators.

Various features of welfare work in behalf of the young women employes are brought out, including scenes of luncheon rooms and rest rooms, which are to be found in all of the company's exchanges.

The picture shows how operators are trained to handle police and fire emergency calls. Chief O'Connor is seen at the head of the Chicago fire department, responding to an alarm. A demonstration of the efficient handling of police calls is given when Ethele, while on duty at the switchboard, hears a cry for help in her receiver and notifies the police, who arrive in time to catch the burglar. It develops that Ethele has sent assistance to the home of the mother of Walter Hargrave, the hero of the story, whom she subsequently weds. The picture closes with the couple happily installed in a suburban bungalow.

About 150 men and women appear in the different scenes and all are employes of the Chicago Telephone Co.'s traffic department.

At the weekly luncheon of the Chicago Electric Club-Jovian League, December 23, this movie was the feature.

Earnings of Keystone Telephone Co.

The Keystone Telephone Co., Philadelphia, Pa., has issued a comparative statement of earnings for the combined companies for the month ended November 30, 1915 and for the eleven months ended on that date. The statement follows:

	For Month Ended Nov. 30, 1915	Year Previous	For Eleven Months Ended Nov. 30, 1915	Year Previous
Gross earnings	$116,148	$109,778	$1,245,419	$1,211,674
Operating expenses and taxes	59,766	53,921	622,391	597,162
Net earnings	56,382	55,857	623,028	614,512
Less interest charges	27,536	25,921	293,860	285,840
Net surplus	$ 28,846	$ 29,936	$ 329,168	$ 328,672

Observations of "Telephony's" London Correspondent

Development of the Girl Operator in London Since the Outbreak of the War—Requirements of Applicants and Methods of Training—Restrictions Placed Upon the Telephone—An American's Experience in Placing a Call in London

By Jack Brooks

The British telephone operator is not too old at 35, for she can retain her job until she is 60 if she cares to, and then retire on a pension. The London operator who had quite a few interesting things to say regarding the work of the telephone girl in London and vicinity was very young herself. According to her, the writer understands that the future of the telephone girl in London is assured. Since the war, with its increasing employment of women, the girl operator has developed wonderfully and is being given distinct opportunities.

If an operator does not marry, she may stay on the exchange until she is an old woman. It is interesting to note, however, that the great majority of them marry after a few years of service. Statistics in this country show that the marriage rate among British girl operators is high. When the "hello girl" marries she is given a bonus. If the bride has been employed at an exchange six years, the bonus will take the form of a six months' salary. The girls themselves say their training at the switchboard makes good wives of them, hence the high marriage rate. Certainly a girl of the London telephone service should make a wife of angelic temper, for she would not last long on the government pay roll were she hot-headed or hasty-tempered.

Average intelligence and quickness are the two assets most desirable in the London "hello girl." A simple examination in reading, writing, dictation and easy arithmetic together with a strict medical examination (good health is most important) admits a girl to the training school. Here five weeks are spent under the tutelage of a seasoned matron of the telephone. The operation of dummy keyboards, telephone lectures and book study on telephone operating, are among the things found in the curriculum of this school.

Part of the duties of this matron is to call her pupils all manner of "nasty names" in an endeavor to get them flurried or out of temper. Those pupils remaining good-tempered or calm, weathering the storm smilingly, reach the exchange stations in due time. During this training the girls receive approximately $10 a month. Upon being installed in a real exchange the student-operator is given $3 extra a month. In slack times she is now allowed to try her hand and ear at the "real thing," under the watchful eye of the supervisor. For six months the student is never left to her own resources, although by this time she may be thoroughly efficient. The assistant supervisor stands behind every eight girls, disentangling muddles and seeing that calls are made quickly.

The British telephone maid starts her training between the age of 16 and 19. By the time she is 21 she should be earning her $20 a month and, a little later on, should be getting $30 a month. The assistant supervisor earns from $400 to $500 a year, and supervisors and clerks in charge, from $725 to $1,500 a year.

As this telephone girl expressed it: "We earn good salaries; our hours are not too long, and we are not up against the 'too-old-at-35' tragedy." The hours of these operators are seven and a half a day with 45 minutes for lunch (dinner) and 15 minutes for tea (supper). The young women have a two weeks' vacation each year. If they have been with an exchange five years they receive three weeks' vacation every year. On bank holidays (certain days of the year pronounced as legal British holidays) extra pay is given to those girls who work as usual. An extra 26 cents a week is paid girls who can speak French.

According to a new post office regulation recently issued no language other than English can now be employed when talking over the British telephone—unless a special permit has been obtained for the purpose. In the early days of the war the English in Paris were surprised to suddenly find themselves cut off when attempting to converse in their usual language. Now, it seems, the same course will be pursued in London with languages other than English. The question now seems to be whether or not the Welsh language will be considered "English." If in the negative one thinks that the telephone operator will have to have a lot of courage to demand a special permit before the gentleman from Llandudno can speak in his native tongue to his uncle in London.

Additional burdens also are being heaped on the bowed head of the telephone subscriber. In addition to the increased telephone rates which, by the way, went into effect the first day of October, extra charges are now to be made where a subscriber has use of submarine cables. In effect the new order means that a subscriber telephoning from England to the Isle of Wight must pay an extra eight cents in addition to the regular telephone rates, and a subscriber talking from England to Ireland must pay an additional 50 cents on his call tariff. The reason for these extra charges for submarine cable usage is not given by the authorities.

"If only there was a form to fill in," groaned an American, who for ten minutes had been trying at a London telephone call office, to get through.

"A form?" echoed an English friend, "what do you mean?"

"Why," said the other "since I left New York I've done nothing but fill in official forms. You can't seem to do anythink in this country without first filling in a form. I thought if I could fill in a telephone form of some kind I should be able to get my party—haven't your telephone people overlooked it?"

Perhaps a form would help the telephone business over here; certainly it would bring joy to the advocates of red tape. TELEPHONY's London correspondent had occasion the other day to call a big business house in London from a Whitechapel sub-postoffice. There was no sinking floor to this booth, but the walls were plastered with directions. The caller was reminded carefully in variegated type to first life the receiver to his ear and wait for exchange to speak; then to speak slowly and deliberately, keeping the receiver pressed against the ear; then to hang the receiver up large end downwards on the hook at the conclusion of his conversation.

After waiting four minutes exchange graciously inquired the number. Another interminable wait and the voice (it was a woman's) said: "Place threepence in the slot, please; put each penny in separately (there's only room for one at a time) and turn the handle after each penny."

After all this was properly executed (and the noise of each coin falling was like a Zeppelin bomb in London)

somebody said, quite sullenly, "Hullo," and I found I was connected with the business house in question. What would have happened had a threepenny bit been dropped into the slot instead of three separate coins, goodness alone knows. A threepenny bit (silver) is the size of a dime, while the British penny (two cents) is in size like half a dollar.

M. de Lange, vice-president of the Naamlooze Vennootschap de Nederlandsche Thermo-Telephoon Maatschappij, of Utrecht, Holland, and inventor of the Thermophone, a telephone device for the use of semi-deaf persons, is planning to visit the United States in January.

TELEPHONY'S correspondent in London received a letter several weeks ago from Mr. de Lange, in which the latter stated he was expecting to reach London shortly with R. A. Baron van Lynden, a co-director of his company, and would spend some time in the British capital before making a trip to America.

Since the Zeppelins have taken to visiting England, most of the railroad companies have installed telephones in the railway signal towers. These have direct connection each with the other for miles along the tracks. A London "special" whose duties keep him in the tower in his own district all day and sometimes night, says the signalmen prefer the telephone to the telegraph which was used on all the roads until within the last few months. It seems the hurried warning that has to be given along the route when a Zeppelin is sighted headed inland, is much preferred over the telephone than by telegraph. "We don't have much time for writing these kind of reports down on pads," said the "special," "therefore the telephone is so popular."

It is known that during the last air raids over London, the telephones were invaluable for the authorities. The public has been asked, however, not to call up on the telephone directly after a raid. Everyone, of course, having a telephone wants to tell his or her friend or relative or sweetheart or mother-in-law, as the case may be, that he (or she) has just seen the Zeppelin.

The profit of the Montevideo Telephone Co., Ltd., Uruguay, South America, for the year ending July 31, 1915, is approximately $128,800, according to the report just issued in London. The previous year the net profit was $141,600. This falling off is due mainly to the decreased number of subscribers brought about by the war.

The continued withdrawal of telephonists from the British telephone service for repairing and constructing the telephone lines necessary in the conduct of the war, is becoming rather serious from the standpoint of the post office, ample proof being forthcoming, both from the reports of the controllers and from the telephonists themselves. So far as the Hull telephone service is concerned, further withdrawals have been suspended pending inquiry. The Hull service, of course, is not under government control, it being the only municipal service that exists apart from the post office service, in Britain. The officials of the Hull service now report that unless the withdrawal of men from the municipal plant is stopped, the service will soon be brought to a standstill, and not only the military lines of the district, but the lines of the firms engaged on munitions work, will be cut off.

Just now the Hull people are practicing economy. The engineers state that all underground extensions will cease and that new subscribers will be connected up as economically as possible. In this way it is expected to reduce expenditures to about $10,000 in 12 months. In addition it is proposed to introduce a new ruling, that of making the subscriber pay for the installation.

According to one of the London dailies Norway proposes to spend within the next six years, $1,350,000 on a state telephone service. The first automatic exchange to be established in that country will cost in the neighborhood of $265,000.

In a recent issue of the Electrical Review, of London, a writer enlarges on "the ideal transmitter" and endeavors to show what elements constitute this. It is contended that the "Hunnings'" granular transmitter has done for telephony what the incandescent mantle has accomplished for the gas world. It is pointed out that the chief requirements for the ideal transmitter would be:

1. Very little or no current used when not being spoken into, though the circuit be closed.
2. Absolute freedom from "frying and boiling" sounds and foreign noises of all kinds.
3. No tendency to "pack."
4. Should be loud-speaking, that is, its resistance should show great variation with but slight vibration of its diaphragm.
5. Lastly it should be clear-speaking.

The writer says: "The only transmitter (so far as I know) which passes no current (whether speaking or not) is one which is constructed on the principle of the condenser and which varies its capacity in unison with the sound vibrations, and, being connected across the line in such a manner that the value of the current flowing through the receiver is varied, it thus transmits speech. The non-success of this form, though it speaks very clearly and is absolutely free from foreign noises, is due to its very feeble results.

"As to No. 2: This is perfectly fulfilled by the abovementioned transmitter. If a small mirror be affixed to a vibrating diaphragm in such manner that a beam of light may be made to impinge upon a selenium cell with greater or less intensity, the cell being in circuit with a battery and a receiver, speech may be thus transmitted."

The writer thinks No. 3 is due to a settling down of the granules and may be overcome temporarily, by giving the transmitter a half turn occasionally, thus shaking up the particles.

Rather unusual is it in England for telephone poles to decay and break off below the ground line, hence, when a government pole issued in 1912 and erected eighteen months later, did this recently, killing a lineman who was on it, it was reported as a very unusual fatality. This pole was forty inches in circumference where it broke. A government sectional engineer said the life of such poles is anywhere from twelve to fifteen years. It was sounded with a hammer, before the man went aloft and "apparently had a good heart."

A telephone outfit for airmen consisting of a head set with two watch-case receivers and a special kind of transmitter worn under the clothing on the chest, is being put out by the company, "Le Materiel Telephonique," a French concern, as its name implies. The apparatus is connected by flexibles and plugs to a circuit provided in the fusilage, and a battery of three dry cells is supplied, capable of maintaining communication for 100 hours. Despite the noise of propellers and strong winds, conversation, it is said, is most successful, even when traveling at a rapid pace.

A concession for the establishment and operation of a public telephone service in Argentina, South America, has been granted Don Ramon Tarrio Damaria, according to the Board of Trade Journal, of London. The districts in which the service will be operated are Bernascom, Villa Alba and Jacento Arauz. The period is for 30 years.

Putting Johnstown On the Map.

The Johnstown (Pa.) Merchants' Association has issued an attractive folder entitled "Putting Johnstown on the Map." Included under the caption, "Things We Are Proud Of," on the last page of the booklet, are street improvements, street car service and the Johnstown Telephone Co. The telephone company, it states, operates a total of 8,500 telephones, has 15,000 miles of wire, and 12,500 miles of wire in underground cables. The company handles an average of 80,000 calls daily.

Membership Committee of United States Association.

The committee on membership of the new United States Independent Telephone Association, at a meeting of the board of directors held at the conclusion of the Chicago convention, was made permanent, as President McVey stated would probably be the case when he appointed the committee.

In TELEPHONY'S report of the convention, Chas. S. Norton, of Indianapolis, Ind., was stated to be one of the committee. This is an error and the name should have been Chas. L. Norton, of Columbus, Ohio. The committee which is now permanent consists of the following:

W. S. Vivian, Chicago, chairman; L. E. Hurtz, Lincoln, Neb.; Hart Farwell, Terre Haute, Ind.; F. L. Beam, Mt. Vernon, Ohio; E. D. Schade, Johnstown, Pa.; P. S. Hogue, Louisville, Ky.; W. J. Melchers, Owosso, Mich.; C. B. Cheadle, Joliet, Ill.; W. N. McAnge, Jr., Corinth, Miss.; Chas. L. Norton, Columbus, Ohio, and J. C. Crowley, Superior, Wis.

The committee is active in the work of securing additional members and new names are constantly being added to the list of members of the new United States association.

Convention of Illinois Association.

The eleventh annual convention of the Illinois Independent Telephone Association will be held at the Leland Hotel, Springfield, Ill., January 18, 19 and 20. The entire third floor of the hotel has been reserved for exhibition purposes and about 20 manufacturers and jobbers have already reserved rooms for display purposes.

Telephone Connections in Langlade County, Wis.

With the completion of the line of the Military Telephone Co., Antigo, Wis., is in telephone communication with practically every portion of Langlade county. The new line extends eastward to the farthermost portions of the county.

Queries on Theory and Practice

Impedance Coil for Intercommunicating Systems.

We have four intercommunicating systems which are to be used independent of each other. The systems are supplied from one battery. Kindly advise me what method of calculation you would use to determine the reactance resistance necessary in the battery lead to prevent the voice currents entering other battery leads.

In the selection of an impedance coil calculation usually does not enter, but the coil is designed to give as high an impedance as possible for a given resistance. The resistance of the coil itself is usually fixed by the voltage of the battery and the desired current flow.

If you have 12 volts available, we suggest a 50-ohm winding in each battery lead, that is, a coil having two separate 50-ohm windings on the same core. The coils must have enough volume to insure getting a large number of turns of wire without exceeding the 50-ohm limit.

Any of the responsible telephone manufacturers can supply good coils of this description. If your intercommunicating systems have less than a 12-volt battery, it is best to increase it to 12 volts, to secure the advantage of better transmission and a better impedance coil. If the voltage is too low, the resistance of the impedance coil will be so low as to prevent getting enough impedance in a coil of reasonable size.

Slow-Acting Relays.

I have noticed that some slow-acting relays are arranged with a copper yoke over the end of the core and others with a copper sleeve over the entire core. Can you give an explanation of the action of the two arrangements of the copper? Also can you supply any references in regard to the action of these relays?

The principle underlying the use of a copper yoke or "slug" on the end of the relay core and a copper sleeve over the entire core is the same in both cases. When the current flowing in the winding of the ordinary relay is interrupted, the magnetic flux through the core and armature is destroyed in a very short time and the armature is released. Since the magnetic lines of force in such a case are rapidly withdrawn from the core, frame and armature of the relay, it follows that any closed or complete circuit in a coil of wire around the core will have an induced current produced in itself in such a direction as to tend *to oppose the destruction* of the magnetic flux which has been retaining the armature.

In the slow-acting relay the copper slug or yoke, as well as the copper sleeve, constitute a closed circuit *winding* or coil around the core of very low resistance and having *one turn*. Any sudden disturbance in the magnetic flux through the core will produce an induced current in the copper slug or sleeve, of very low voltage—since there is only one turn around the core—but of high amperage due to its very low resistance. This induced current will have the effect of maintaining for some time, the *existing* magnetic flux in the core and armature and will, therefore, retain the armature after the current in the relay winding has been interrupted.

If the copper sleeve or slug is made thicker, its resistance will be correspondingly lower and the induced current stronger. Therefore, for any given set of dimensions and relay windings it is true that the thicker the copper coil, the slower will the relay be in releasing. The effect of the copper slug is not so marked in the operation of the relay when pulling up as the magnetic circuit is of lower reluctance when the relay armature is away from the core and the air gap is longer.

Grounded Line Too Heavily Loaded.

We are having lots of trouble on our grounded rural lines in getting central. We have 24 to 26 telephones on a line, about 30 miles in length; telephones have five-bar generators with 1,600-ohm bells. Central can ring them O. K. The distance from the switchboard to the first telephone on the line is four or five miles. The board has 100 and 500-ohm drops. What is the proper resistance in drops for these lines?

To begin with, you are attempting the impossible when you try to give telephone service to so many on one line. Your ringing troubles will never end as long as the line is so heavily loaded. It can be improved by equipping each telephone with a ½ microfarad condenser in series with its receiver, to lessen the evil of listeners.

The drop should be about 1,000 ohms and carefully adjusted. Sometimes it is necessary to replace the drop with a bell of the same kind as those used on the line for a bell is more sensitive than a drop. But by all means rearrange your rural telephones to have fewer per line.

Possible Telephone Development in Foreign Fields

Organization of American International Corporation to Finance American Trade in Foreign Countries—Theodore N. Vail, a Member of Board of Directors—Possibilities for Expansion of Telephone Properties in Europe, Canada, Asia, South America and Other Countries

Country-wide interest has been aroused by the formation in New York of the $50,000,000 American International Corporation, backed by representative business men and financiers of the United States, which will have as its principal object the financing of American trade in foreign countries and the furnishing of capital to foreign governments, utility, mineral and agricultural projects. Of chief interest to telephone men is the presence of Theodore N. Vail, president of the American Telephone & Telegraph Co., on the board of the new corporation, and the possible relation of the new concern to future telephone development of the world.

Plans of American International Corporation.

The plans of the American International Corporation made public with its incorporation at Albany, N. Y., revealed that a way had apparently been found for the employment of surplus capital of this country in foreign fields along practical lines that would not only insure a permanence for the United States in world trade and finance but aid in solving domestic problems which have arisen from the great influx of gold and the lopsided balance of trade in our favor. Just what connection the corporation will have with telephone properties and development of this and foreign countries is problematical at this time but the scope of the organization is so vast that it is not beyond the realm of possibility that eventually it will figure prominently.

The foreign telephone field is not entirely governmental by any means, and even in the case of systems under federal ownership and operation it is possible that the American International Corporation can become vitally interested. The corporation plans to sell foreign securities direct to investors of this country and, where such securities are not well known, to issue its own debentures which in turn will be secured by the foreign securities underlying them. This prospect alone opens up a vista of financing that can include the aiding of governmental expansion of telephone properties as well as the furnishing of necessary capital to private companies operating telephone systems in foreign fields. Some idea of the importance of the new corporation can be gained from the fact that it should be able to invest $500,000,000 in foreign issues on its present capital.

The development of wireless telephony, according to some authorities, must eventually have an effect of co-ordinating, in a sense, the telephone systems of the world. At any rate those who attempt to visualize its potentialities declare that the least effect it can have is to direct unusual attention to the growth of the telephone in this country with the result that many foreign nations in process of rehabilitation after the war, will not be satisfied to go back to the old order of antiquated telephone service.

It is obvious that in the case of Europe there must be much rebuilding of telephone plant and equipment which have been destroyed by military operations. It is easy to go a step farther and see a telephone development in these areas far in advance of what it was before it was destroyed. Other fields, such as the Orient and South America, offer as great or greater chances for telephonic growth because of their present backwardness in this direction, nor is Europe so far ahead of them.

That these points have not been overlooked by the organizers of the American International Corporation is revealed in the company's charter and in the selection of a practical telephone man on the board of directors. That these phases received less public attention is because of the more popular matters of the organization, such as the connection with it of big packing, shipping, steel, oil and banking interests.

No field could offer such chance for rapid growth as the telephone. Its development to a point where it represents a plant investment throughout the world of $2,089,534,000 in the short space that has elapsed since the first "toy" telephone, is sufficient proof of this. The taking over of telephone services by governments has removed much of this great utility from the field of private investment. But despite the fact that some governments have been satisfied to run this property without regard to present and future requirements or to rate scales and other charges that would be considered imperative in private business conduct, gross telephone earnings of the world amounted to something like $486,000,000 in 1913. This compared with $444,881,200 in 1912, and represented an increase for 1913 of over $41,000,000. Gains are more substantial in the case of private companies which adhere to business methods and it must naturally be more along the line of aiding private enterprise in this field that the American International Corporation will be interested.

The American International Corporation was formed by Frank A. Vanderlip, president of the National City Bank of New York, and is directly connected with that institution which already has branches in many foreign countries. The new company will direct its attention to China, Japan, Russia, South America and foreign countries generally. Its charter is one of the broadest ever drawn and is designed to permit the transaction of substantially every kind of business from financing a government to running a hotel. The charter specifically provides that the company has the right to develop utilities and to promote and build telephone and telegraph systems in any part of the world outside of New York.

Telephone Development in United States and Elsewhere.

The latest statistics compiled as on January 1, 1914, show that in the United States there are 9,542,017 telephones, as against a total of private and government telephones in the United States, Canada, Central America, Mexico and the West Indies of 10,120,948. There are 9.7 telephones per 100 population in the United States, the population per square mile being 33. A comparison of these figures with those relating to foreign countries reveals conclusively that there is a vast field for development abroad.

In Canada the government system has 106,183 telephones and there are 393,591 privately owned, or a total of 499,774. This is 3.36 per cent. of the total for the world. Telephones per 100 population are at the rate of 6.5 and the population per square mile is two.

In closely populated Europe the comparison is particularly enlightening. Great Britain has but 780,512 telephones, government owned, or 1.7 per 100 population, as against the 9.7 of the United States. Great Britain's population per square mile is 381. Her telephones amount to only 5.24 per cent. of the world's total. The number of miles of telephone wire in Great Britain amounts to 2,581,895 as against 22,137,479 in the United States.

The German empire makes a better showing than Great Britain, but its government owned system is far behind the private systems of the United States. It has 1,420,100 telephones, 9.54 per cent. of the entire world, 2.1 per 100 population, the population of the empire being 381 per square mile. Ger-

many's telephone wire mileage is almost double that of Great Britain and its efficacy for military usage has been widely commented on. To a certain extent it can be compared in military value with the empire's wonderful system of railroads. The wire mileage is 4,548,339, or 12.18 per cent. of the world, second only to the United States, which has 59.29 per cent. of the world's mileage.

In the congested country of the Netherlands, which has 471 people to a square mile, it is interesting to note that it has but 1.6 telephones per 100 population. France has 330,000 telephones, government owned, 2.22 per cent. of the world's total and 0.8 per 100 population, the population being 192 per square mile. European Russia has 157,710 telephones, government owned, and 162,148 privately owned, 2.15 per cent. of the entire world and 0.2 per 100 population, the population being 73 per square mile. In all European countries telephone systems are operated by the government but there are also private systems in Denmark, Italy, Netherlands, Norway, Portugal, Russia, Spain and Sweden.

No better proof of the chance for development of European telephone systems is needed than the fact that the total telephones in all Europe are less than half the number of telephones in the United States alone. The total for Europe is 4,012,709 against 9,542,017 for this country. This amounts to only 26.95 per cent. of the world's total, with the population the most congested of any part of the world, being 121 to the square mile, and means that there is less than one telephone for each 100 persons as against 9.7 in the United States with a population only 33 per square mile.

Telephones in Asia total 271,105, government owned, and 34,980 privately owned, .44 per cent. of the world, and .04 per 100 population, the population being 53 per square mile. Africa has 51,927 government owned and 13,169 private, .44 per cent. of the world, and .05 per 100 population, the population being 12 per square mile. Oceania has 201,443, government owned, and 15,938, private, or 1.46 per cent. of the world, and .4 per 100 population, the population being 13 per square mile.

A great undeveloped telephone field lies in the countries of Asia and South America, probably more than elsewhere, and it is to these countries that the American International Corporation is looking. South America has a total of 3,529 government and 162,802 privately owned telephones, amounting to 1.12 per cent. of the world, and 0.3 per 100 population, the population being 8 per square mile.

Upon further reference to the figures given it can be seen that the aggregate of all telephones in all outside countries comes to only 5,366,733, or only slightly more than half the number of telephones in the United States. With 22,137,479 miles of telephone wire, the United States leads the combined countries of the world by 13,879,708, or 63 per cent.

Meeting of Central Home Operators at Marion, Ky.

The photograph taken of those who attended the operators' meeting of the Central Home Telephone & Telegraph Co., at Marion, Ky., was received too late to be used with the account of the meeting published in last week's issue of TELEPHONY. The accompanying illustration is reproduced from a photograph of those in attendance at the meeting, which was a most successful one.

Those in Attendance at the Operators' Meeting of Central Home.

From Factory and Salesroom

Conventions: Illinois, Springfield, January 18-20; Minnesota, Minneapolis, January 25-26; Wisconsin, Madison, February 9-11; Kansas, Topeka, February 15-17

Thompson-Levering's Exhibit at National Convention.

Due to an oversight mention of the exhibit of the Thompson-Levering Co., of Philadelphia, Pa., at the national convention recently held in Chicago, was omitted from the report of the manufacturers' exhibits, published in TELEPHONY of December 11. The Thompson-Levering Co. had a large exhibit, showing some new testing equipment and a number of instruments of its standard line. Among the instruments exhibited were the Peerless switch dial test set T-2,000, a large type switch dial test set T-2,005, a government standard test set T-2,070, a Peerless plug type testing set T-2,010, standard portable galvanometer, standard Wheatstone bridge for long distance toll line testing, the type adopted by the A. T. & T. Co.

There was also exhibited a special wire chief's desk fault finders, arranged for mounting in the wire chief's desk, a standard portable fault finder T-2,062, proportional type testing set T-2,012, a large laboratory standard Wheatstone bridge for precision measurements, a standard 32-mile, subdivided, artificial cable, used for transmission testing; a number of small portable voltmeters and ammeters, also switchboard type, both for front of board mounting and flush type mounting and instruments for general fault location.

The Thompson-Levering Co. also had a wall hanger, showing a large number of their testing instruments, which they distributed to visitors. A large number of telephone men visited the exhibit, which was in charge of W. J. Thompson, assisted by W. D. Lindsey and C. L. Howk.

New International Motor Truck Manager at Chicago.

An aggressive campaign on International motor trucks in Chicago is expected to result from the appointment of L. Barnabas as manager of Chicago sales to succeed J. D. Cameron. Mr. Barnabas, now in charge of the International Harvester Co.'s Chicago sales room, 1814 Michigan avenue, is a motor truck enthusiast whose interest in the use of motor trucks, especially in large cities, has increased continuously with his long experience.

"The motor truck is a much misunderstood beast of burden," he says. "If the men who own the trucks could also run them, if only for a short time, the motor truck factories could

not turn out trucks fast enough. The men who drive the trucks are all right as drivers, but they accept the truck as a mere substitute for the horse, running it as they would a team, and fail to take advantage, for their employers, of the higher speed and greater mobility of the truck.

Horses have been used for short hauls so long that the whole system of local transportation of goods has been built up on horse lines. Our freight terminals, and the loading and unloading facilities of our factories, warehouses, steamship lines, railroad lines, and wholesale establishments are all planned for the use of horsedrawn vehicles. The handling and routing of goods in local transit, even after years of motor truck use and success, is only beginning to be changed over to suit the advantages of the truck.

We need a thorough campaign of education, conducted through the motor truck trade papers and the daily press, to bring home to the present owners of trucks, as well as to prospective buyers, the need for a thorough-going revision of freight handling equipment and methods. When that is done, the far more economical motor truck can make the showing it is capable of.

Our company is now at work on some helpful material for such a campaign. Almost the first thing we discovered was that Chicago business men were actually throwing away an average of $300 a year or more apiece by using horses for work that the motor truck should be doing. There is no question but what motor trucks would be doing this work if the business men of Chicago thoroughly understood the situation."

Damage Done to Pole Lines by Gulf Storm.

The Cumberland Telephone & Telegraph Co. maintains two pole and wire lines along the Texas & Pacific Railroad between Algiers and Avondale, La., one of creosoted pine poles and the other sawed cypress. As a result of the gulf storm which visited the New Orleans district in September, the creosoted pine line held up with scattering poles leaning, while the old sawed cypress line went down for a distance of half a mile.

Pole Line of Cumberland along T. & P. R. R.—Guys and Cable Saved Poles from Blowing Completely Over near New Orleans.

On the New Orleans-Shreveport route on Teche street, McDonoghville, guys and cable saved the poles from blowing completely over, as may be seen in one of the accompanying illustrations.

Certified Public Accountants in Indiana.

Attention has been directed to an item published in TELEPHONY of November 27, which states that "the last session of the legislature in Indiana passed a bill requiring all accountants practicing public utility accounting in that state to be certified public accountants."

This statement was made owing to a misunderstanding of the bill, which does not require a person to be a certified public accountant to practice public accounting in Indiana. It does provide, however, that certain qualifications shall be shown before the State Board of Certified Public Accountants shall grant a certified public accountant's certificate.

Paragraphs.

W. J. THOMPSON, of the Thompson-Levering Co., Philadelphia, Pa., has just completed a Western trip, during which time he visited Pittsburgh, St. Louis, Kansas City, Omaha, Des Moines, Minneapolis, St. Paul and Chicago. He reports that the outlook for 1916 is extremely bright and business is very good throughout the entire territory.

THE DIAMOND EXPANSION BOLT CO., of New York, has been granted injunctions in the United States District Court restraining several companies from making or using, or selling or offering to make or use or sell, any expansion bolt in infringement of Pleister patent No. 973,559 and from manufacturing or selling or offering to manufacture or sell any lag shields made to imitate or simulate "Diamond shield," "Diamond lag shields," "Diamond N lag shield" or "Diamond anchors" and from directly or indirectly continuing unfair competition with the Diamond company.

THE LEEDS & NORTHRUP CO., of Philadelphia, Pa., is sending out to the trade its new catalog No. 40 on "Apparatus for Measuring Low Resistance and Conductivity," and bulletin No. 710 on the Simplex Wire & Cable Co.'s voltmeter. The new L. & N. catalog includes redesigns of the low resistance standard used principally as part of a Kelvin double bridge equipment, and the Hoopes' conductivity bridge in which a number of improvements have been made. Those not receiving copies of this new catalog, and also bulletin No. 710, may obtain them by addressing the company at 4901 Stenton avenue, Philadelphia.

Bell Places Wires in Conduits in Massillon, Ohio.

The Central Union Telephone Co. is engaged in placing its wires in the business section of the city of Massillon, Ohio, underground and increasing the capacity of its present exchange to accommodate the increase in the number of subscribers, according to Manager L. V. Beamer.

Underground conduits will be laid in Tremont street from Erie to Park streets and in Main street from Clay to Cedar streets and in Erie street from Oak to Plum streets. Laterals will run from the main conduits and all the company's poles in that section will be removed.

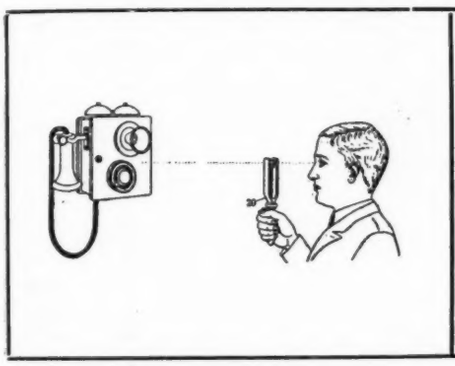
Cables containing 1,200 wires will be laid in these conduits.

Mr. Beamer said that in order to provide ample accommodations for new subscribers new aerial cables are to be erected on most of the pole lines.

Record of Telephone Patents Recently Issued

1,160,125. November 16, 1915. DICTOGRAPH INTERCOMMUNICATING TELEPHONE SYSTEM; W. P. Andrick, Jamaica, N. Y.; assigned to General Acoustic Co., Jamaica. This system, which is designed for factories and business purposes, has a master station in connection with a number of substations. A three-wire circuit extends from a master station to the substation. Means are provided for simultaneously connecting two wires of the three-wire circuit to the substation instrument, the third wire being tapped into circuit between the instruments and all other connections from the substation instruments being eliminated.

1,160,181. November 16, 1915. MACHINE TELEPHONE SWITCHING SYSTEM; F. R. McBerty, New Rochelle, N. Y., and D. Koenig, Antwerp, Belgium; assigned to Western Electric Co. In this system a plurality of variably operable multiple-position switches are arranged so as to be brought, one after another, into association with an impulse circuit in which is connected sending mechanism and a relay. The switches are set in response to short interruptions produced in the circuit by the sending mechanism. An electro-responsive device operates in response to a longer interruption produced in the circuit by the sending mechanism to cause a change over from one switch to the next and is responsive to a prolonged interruption of the circuit to produce the restoration to normal of the switches.



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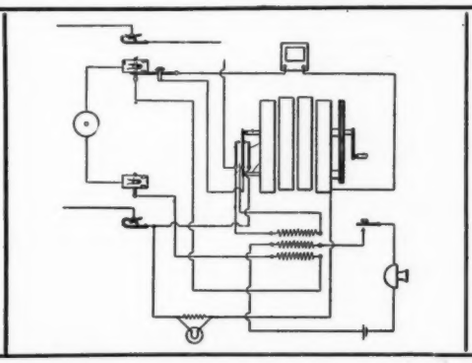
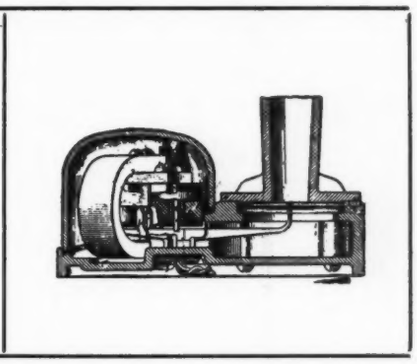


No. 1,161,082.



No. 1,161,639.

1,160,294. November 16, 1915. SELECTIVE SIGNALING SYSTEM; O. M. Leich, Genoa, Ill.; assigned to Cracraft, Leich Electric Co. A polarized harmonic ringer is covered by this patent. It comprises two pole pieces; an armature which is at all times in closer proximity to one pole piece than to the other; a permanent magnet for polarizing the armature; a tuned spring upon which the armature is mounted; and a winding for the pole piece, having effective relation with the armature.

1,160,356. November 16, 1915. APPARATUS FOR DETERMINING THE SPEED OF ROTATION OF IMPULSE TRANSMITTERS; A. H. Adams, Sparkill, N. Y.; assigned to Western Electric Co. This apparatus consists of an indicator used in combination with a stroboscope for determining the speed of calling devices for automatic telephone exchanges. The indicator is marked with two series of circumferentially arranged indications of different number per sector and suitably mounted on the rotating dial of the calling device.

1,160,447. November 16, 1915. MACHINE TELEPHONE SWITCHING SYSTEM; L. Polinkowsky, Brussels, Belgium; assigned to Western Electric Co. The feature of this system is an automatic selecting switch in which a plurality of circuits terminate. A test circuit is associated with the switch for testing the busy or idle condition of the circuits terminating in it as indicated on test contacts individual to the circuits. Contacts included in the test circuit are controlled by the selecting switch and closed by it in its movement from one position in which connection is made to one of the plurality of circuits to its next such position, only after the contact of the test circuit with the test contact of the circuit individual to the position from which the switch is moving, has been opened. It is maintained closed for a definite portion of the movement of the switch into the next position.

1,160,545. November 16, 1915. MOUTHPIECE; L. Steinberger, Brooklyn, N. Y. This mouthpiece for a telephone transmitter comprises an annual disk-like member of a diameter substantially the same as the exterior diameter of the transmitter casing and arranged over the end of the casing. This part is concaved on its inner surface and convexed on its outer surface. It has an outwardly flaring aperture centrally therethrough.

1,160,547. November 16, 1915. ELECTRICAL CONNECTION FOR ELECTRICAL RELAYS; C. Stille, Zehlendorf-West, near Berlin, Germany. A microphone relay device is described in this patent. It comprises a microphone and suspended primary and secondary coils movable against each other, arms being carried by the coil. The microphone is subjected to pressure from the coils. The circuit includes the secondary coil, a battery and the microphone, while a receiver is connected across the circuit.

1,160,570. November 16, 1915. PREPAY BOX FOR USE IN TELEPHONE SYSTEM; O. Brisbois, Chicago; assigned to J. H. Ware, Chicago. The feature of this coin collector is the provision of means to prevent a coin from entering the coin slot except under certain conditions. A lever having its movable end in the path of movement of a coin entering the slot has a latch which is in combination with a movable contact. There is a driving connection between the lever and the contact, while a stationary contact is adapted to co-act with the movable contact.

1,160,951. November 16, 1915. AUTOMATIC TRUNKING SYSTEM; O. V. Olson, Chicago; assigned to Automatic Electric Co. A line-switch-governing-master-switch is the feature of this trunking system. It is provided with a propelling magnet, the energization of which is interrupted at intervals by the operation of a swinging member so that the master switch may be positively locked against motion while at rest.

1,160,994. November 16, 1915. PAY STATION TELEPHONE SYSTEM; J. Erickson, Chicago; assigned to First Trust & Savings Bank, Chicago. The subscriber's pay station equipment comprises an electromagnet which is energized when the subscriber calls. A switch is closed by the energization of the electromagnet and a locking device temporarily maintains the closing of the switch. The depositing of a coin against the locking device opens the switch. A second electromagnet is provided so that the switch may be opened if a coin is not deposited.

1,161,010. November 16, 1915. ELECTRICAL DEVICE; M. Setter, Chicago; assigned to First Trust & Savings Bank, Chicago. A combined drop and jack is described. The drop shutter is adapted to be restored by the insertion of a plug in the jack. Springs are carried on a casing of an electromagnet. The armature of the magnet is sustained on a pivoted latch of the drop shutter by means of a spring clip. The casing, magnet, springs, latch and armature are assembled as a unit which is removable as a whole without disturbing the shutter.

14,010. November 16, 1915. (Reissue original patent 1,020,975. March 26, 1912.) SELECTIVE SIGNALING SYSTEM; E. R. Gill, Yonkers, N. Y.; assigned to Hall Switch & Signal Co., Garwood, N. J. A polarized signaling device is bridged across a telephone line which has current supplying means. Means actuated by impulses impressed upon a telegraph line, apply the current supplying means to the telephone lines so that the current will flow therethrough alternately in opposite directions.

1,161,048. November 23, 1915. TELEPHONE SYSTEM; H. L. Harris, Elyria, Ohio; assigned to Garford Mfg. Co. A private branch exchange system is described. Connective means including a plug and jack switch are provided at the central office to designate one of the substations as an attendant station. Means automatically and jointly controlled by relay devices associated with the connective means and with the calling line, establish a circuit between the attendant station and a calling line.

1,161,082. November 23, 1915. TESTING DEVICE; E. S. Stewart and C. D. Stewart, Ottawa, Ill. A low resistance receiver adapted for shunt connection with a small portion of the line circuit is capable of giving audible signals when distinctive circuit conditions are established on the line. One of the windings of an induction coil is adapted for connection with the line circuit and the other winding, being of very low resistance, is adapted for periodic serial inclusion with the low resistance receiver when used for incoming transmission.

1,161,126. November 23, 1915. SELECTOR FOR TELEPHONE PLANTS; G. Grave, Nikolassee, near Berlin, Germany; assigned to Siemens & Halske, A. G., Berlin. A locking device retains the adjusting member of the selector in a contacting position, while mechanical means bring the locking device into locking position by the moving force for the adjusting member. Magnetic means are provided for immediately operating the locking member when in locking position and in the moment of contact between the adjusting member and the respective contact.

1,161,192. November 23, 1915. MOUNTING STRUCTURES FOR ELECTRICAL CONDUCTORS; F. B. Cook, Chicago; assigned to Frank B. Cook Co. A method of manufacturing is described. A strip of insulating material is molded about portions of a row of conducting strips, there being weakening slots in the strip of insulating material between the conducting strips so that the groups may be broken apart.

1,161,193. November 23, 1915. PROCESS OF MAKING SPRING JACKS; F. B. Cook, Chicago; assigned to Frank B. Cook Co. This process of assembling component parts of a spring jack structure consist in providing a mounting strip with plug receiving openings in their forward portions. The jack springs are placed upon the strip in their proper relation to the plug receiving openings. Holding strips are then mounted upon both sides of the mounting strip to hold the springs in position.

1,161,194. November 23, 1915. PROCESS OF MAKING CONNECTING PLUGS; F. B. Cook, Chicago; assigned to Frank B. Cook Co. In this process of forming connection plugs, the contacts, of which one is tubular, are relatively positioned. An incoming conductor terminal is positioned in the space that is to receive insulation. The molding insulating material is poured into the spacing between the contacts and that part which receives the terminal to hold them in the proper relation.

1,161,196. November 23, 1915. TELEPHONE EXCHANGE SYSTEM; E. R. Corwin, Chicago; assigned to Frank B. Cook Co. The feature of this system is the provision of a plurality of link connectors inclusive of operator control, motor means for connecting calling and called line ends thereof with calling lines and further extensions thereof. Calling line operative selector switches are provided for selecting the link connectors, the connecting equipment for the line connectors adapting them to their line joining functions independently of the selector switches.

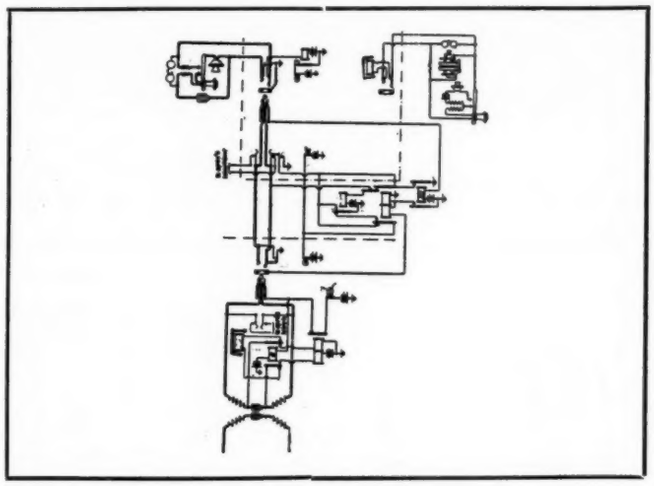
1,161,214. November 23, 1915. TELEPHONE EXCHANGE SYSTEM; E. E. Hinrichen, New York, N. Y.; assigned to Western Electric Co. Magneto and common battery telephone lines are terminated at a local position of the switchboard. The trunk circuit extends from this local position to a toll position and a toll link circuit is adapted for connection with the trunk circuit. Two supervisory signals of different character are connected with the toll link circuit while switching means are associated with the trunk circuit. Upon connection of the trunk circuit with a common battery line, the switching means operate to place one of the supervisory signals of the connected link circuit under control of the common battery line. Upon a connection of the trunk circuit with a magneto line, they operate for placing the other of the supervisory signals under control of the magneto line.

1,161,411. November 23, 1915. TELEPHONE EXCHANGE SYSTEM; L. Polinkowsky, Brussels, Belgium; assigned to Western Electric Co. The feature of this automatic exchange system is a test circuit which is opened by a sequence switch associated with a selector only in case the test circuit remains closed sufficiently long for the sequence switch to move through the positions individual to the test circuit.

1,161,500. November 23, 1915. SELECTING MECHANISM; B. F. Merritt, East Orange, N. J.; assigned to Western Electric Co. This keyboard selecting mechanism comprises a plurality of manually actuated devices. A plurality of members is selectively movable by the manually actuated devices in predetermined groups along paths diagonal to their normal position.

1,161,602. November 23, 1915. OVERFLOW TRUNKING SYSTEM; C. C. Bradbury, Mt. Vernon, N. Y.; assigned to Western Electric Co. In this trunking system for automatic exchanges, the outgoing circuits are of two classes and so arranged that the circuits of one class will all be selected before any of the circuits of the other class are selected. A selector for each of the outgoing circuits of preferred class is provided, while each of the other outgoing circuits appears as an incoming circuit in another group and having access to other outgoing circuits of two classes similar to the outgoing circuits of the first group.

1,161,608. November 23, 1915. SEMI-MECHANICAL TELEPHONE EXCHANGE SYSTEM; A. M. Bullard (deceased); assigned to Western Electric Co. In this system, which is designed for party lines, a connector switch has a plurality of stationary contacts, one for each station on the line. A brush is provided for engagement with the contacts. Means are provided which



No. 1,161,214.

are dependent upon the terminal with which the brush makes connection for differently associating a source of selective ringing current with the line to signal a particular station on the line.

1,161,615. November 23, 1915. CALL DISTRIBUTING TELEPHONE SYSTEM; H. P. Clausen, Mt. Vernon, N. Y.; assigned to Western Electric Co. Means are provided for automatically extending the circuits of the subscriber lines when calling, to idle operators' positions. A line indicator is placed at each operator's position and is controlled by a line finder. The line finders at the different operators' positions have multiple connected line terminals.

1,161,639. November 23, 1915. LOUD-SPEAKING RECEIVER; H. C. Egerton, Ridgewood, N. J.; assigned to Western Electric Co. A mounting plate is placed upon posts in the receiver casing and solenoids for operating an armature connected with a diaphragm are supported by the mounting plate.

1,161,655. November 23, 1915. AUTOMATIC TELEPHONE EXCHANGE; C. L. Goodrum, New York; assigned to Western Electric Co. This patent covers the distribution of incoming calls. The subscribers' circuits are arranged in groups, as are also a series of contacts of finder switches. Each group of contacts correspond in number to the subscribers' circuits in a group and each group of subscribers' circuits are connected to the first group of contacts in one of the finder switches and in multiple to succeeding groups of contacts in different switches.

1,161,762. November 23, 1915. HOLDER FOR TELEPHONES AND OTHER ARTICLES; C. H. Bartlett, Cambridge, Mass. This holder consists of a support having movable catches to grip the base of a telephone desk stand. The catches are operated inwardly or outwardly by the placing or raising of the desk stand upon the support.

1,161,783. November 23, 1915. TELEPHONE TRUNK RELEASE SYSTEM; J. L. E. Meyer, Chicago; assigned to Automatic Electric Co. The line switch in the trunking system of an automatic exchange is provided with a release magnet, which has a circuit for energizing it controlled by a relay. A trunk release circuit is provided for initially energizing the controlled relay in series with the magnet and another circuit is closed by the relay for energizing it in multiple with the magnet.

1,161,837. November 30, 1915. SWITCH FOR AUTOMATIC TELEPHONE SYSTEMS; W. M. Bruce, Jr., Springfield, Ohio; assigned to the International Automatic Telephone Co., Springfield. A plurality of sets of wipers are supplied for banks of terminal contacts, one set for each bank. The contacts in the banks are arranged in groups, the group in one bank being relatively advanced over the groups of contacts in the other bank. Separate means are provided for advancing the wipers by long and short steps to select a group and a contact in the group. Other means connected with the respective groups, cause the wipers to be electrically connected or disconnected and moved into a group pertaining to the group to be selected.

1,161,854. November 30, 1915. CALLING DEVICE; O. F. Fors-

MONARCH
Selective System

Raised Rates

"We installed our Monarch Direct Current Selective System in August, 1908, and now have 650 selective telephones in service. We have no more trouble than with ordinary series telephones. We have been able to raise our rates under this system and to install about three times the number of phones on the same construction."

Used on Farm Lines

"They are giving the best of satisfaction and are not as much trouble to operate as ordinary bridging telephones. The subscribers are better pleased with the service, and quite a number have said they would almost do without telephone service before they would go back to the old bridging telephones. We operate 220 Direct Current Selective Telephones, most all of them being on rural lines."

Satisfactory in Every Way

"According to our records we have been using the Monarch Direct Current Selective System for about six years, and have found it satisfactory in every way. The percentage of trouble with these ringers is no greater than with ordinary ringers, and the equipment in the central office is so simple and gives so little trouble that it does not have to be considered. We have in use at present about 530 of the Monarch Direct Current Selective Sets."

(Names Upon Request)

¶ *Every convention brings us new customers for our Direct Current Selective System. Visitors who have heard of the system and the splendid results it gives are almost invariably surprised at the simplicity of the whole scheme and the absolute freedom from false rings. Those having no acquaintance with it are immediately interested.*

¶ *You cannot conceive of a more simple and reliable means of signaling four telephones selectively. Dry batteries furnish the current. A key in each operator's position switches this current onto either tip or sleeve side of line, and direct current bells respond according to the connections at the ringers.*

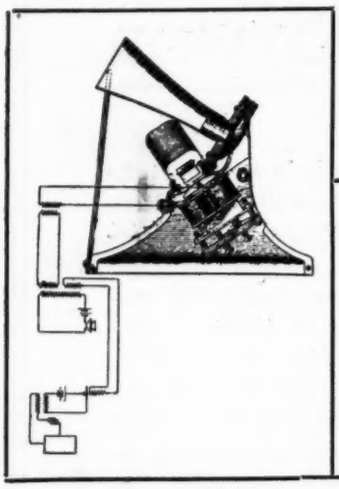
¶ *There is no pole changer, harmonic converter or other ringing machine or device. There are no close adjustments to be made in the ringers. There is only one type of telephone used for all four stations.*

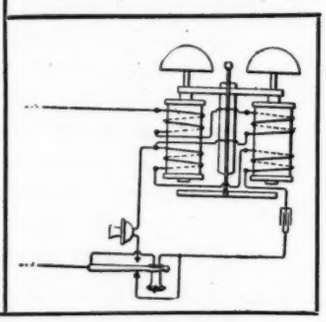
¶ *Read the extracts from three of many letters we have received giving testimony to the efficiency, reliability and economy of this system.*

MONARCH TELEPHONE MANUFACTURING CO.
FORT DODGE, IOWA

berg, Yonkers, N. Y.; assigned to Western Electric Co. This calling device for automatic telephones consists of a dial having a plurality of finger holes mounted upon a rotatable shaft together with an impulse wheel and a gear wheel having co-operative contacts adapted to be actuated by the impulse wheel in accordance with the rotation of the shaft. A governing mechanism is driven from the gear wheel.

1,161,856. November 30, 1915. TELEPHONE RECEIVER; S. P. Grace, New York, and R. A. L. Snyder, Pittsburgh, Pa. This loud speaking receiver has an electromagnet having its cores forming continuations of one of two separated magnetic poles of a magnet. An armature lying between the ends of the cores and the free pole of the magnet





No. 1,161,856. No. 1,162,069.

has a pivoted support intermediate of its ends, the axis of movement of the armature being in a plane parallel with and intermediate of the cores of the electromagnet and also intermediate of the magnetic poles. The ends of the armature are thus subjected simultaneously to oppositely acting forces. The diaphragm is connected to the armature and arranged in a plane passing through the axes of the armature.

1,161,863. November 30, 1915. HOUSE TELEPHONE SET; R. R. Ireland, Chicago, and A. F. F. Gilson, Closter, N. J.; assigned to Western Electric Co. A flush mounting common battery wall telephone set is described. It consists of an outlet box having a cover plate upon which are mounted a push button switch and a spring jack which extend within the outlet box. The cover plate is provided with openings through which the push button and spring jack are accessible so that a telephone hand set may be connected to the jack and another station signaled by means of the push button.

1,161,874. November 30, 1915. TELEPHONE EXCHANGE SYSTEM; W. H. Matthies, Antwerp, Belgium; assigned to Western Electric Co. The feature of this automatic system is the provision of line finding devices at the exchange, which may be automatically connected to a calling line. A group of contacts is operatively associated with each one of a group of line seeking devices. Means are provided for connecting the contacts of each group of contacts to each of the line finding devices, respectively, and for causing one of any desired group of line seeking devices to pick the contacts connected to the line finding device associated with the line of the calling subscriber.

1,161,884. November 30, 1915. TERMINAL BANK; J. N. Reynolds, Greenwich, Conn.; assigned to Western Electric Co. In this patent the combination in a selector switch of three rows of terminals and a set of four brushes is described. The terminals are arranged in a staggered relation and two of the brushes co-operate, one with each of the outer rows and the other two brushes with the inner row, one on either side. Each of the latter brushes contacts in its travel with the alternate terminals.

1,162,007. November 30, 1915. SUBSTATION MESSAGE REGISTER; J. A. Wotton, Montclair, N. J.; assigned to Western Electric Co. This telephone message register is said to be proof against accidental registration. Electromagnetic operating means are controlled by a mechanism consisting of a blocking member and an actuating member for the control of the blocking member. Manually operable means normally lock the actuating member in an inoperative position and is also adapted to release it. The controlling means are restored to normal position by means of an operative connection between the operating means and the actuating member.

1,162,012. November 30, 1915. RECEIVER SUPPORTING ARM; W. R. Armor and L. A. Young, Denver, Colo. In this device the receiver is carried on an extension arm secured to the standard of a desk stand. As the receiver swings into position for use, the receiver hook is released.

1,162,020. November 30, 1915. FIRE ALARM; W. H. Bowman, Bridgeport, Conn. This fire alarm consists of a cylindrical case open at one end and attached to the standard of a desk stand so that the case comes under the receiver hook. Inside the case is a spring upon which is positioned a cap. The spring is held compressed and cap held in place by means of a low melting material. This material upon being melted by heat, releases the spring, thus pushing up the cap against the receiver hook and signaling the operator.

1,162,069. November 30, 1915. TELEPHONE SYSTEM; K. S. Johnson, Jersey City, N. J.; assigned to Western Electric Co. A substation circuit is described. The ringer having a plurality of windings, is normally in circuit with the line to receive signals. The transmitter has one terminal connected to an intermediate point of the windings so as to be in a normally open bridge of the line circuit. Actuation of the receiver hook closes the bridge and includes the receiver in transformer relation to the line circuit, through the windings.

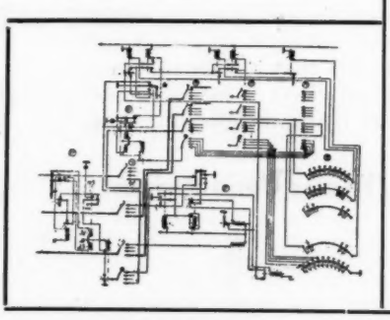
1,162,159. November 30, 1915. MESSAGE DELIVERY SYSTEM; O. W. Hart, Fall River, Mass. This system is adapted for railway use. The telephone circuits are used so that a memorandum device at one station has the delivery of the memorandum controlled from another station.

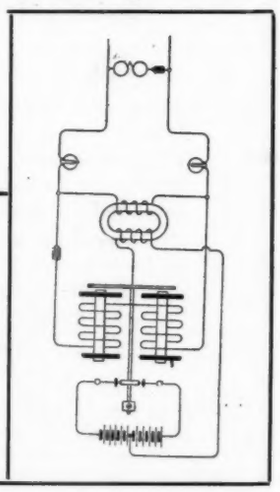
1,162,514. November 30, 1915. CONTROLLING APPARATUS FOR ELECTRICAL SWITCHING SYSTEMS; J. N. Reynolds, Greenwich, Conn.; assigned to Western Electric Co. A switchboard key for semi-automatic telephone systems is described. It consists of a plunger having a plurality of sets of contacts associated with it. A cam or contact operating member is loosely mounted on the plunger. Automatically operated means cause a backward and forward rotary movement of the cam so that it alternately actuates the sets of contacts upon the repeated displacement of the plunger.

1,162,556. November 30, 1915. AUTOMATIC TELEPHONE EXCHANGE SYSTEM; G. A. Betulander, Södertörns, Vilastad, and N. G. Palmgren, Stockholm, Sweden; assigned to Relay Automatic Telephone Co., London, England. In this relay automatic system a plurality of numerical groups of outgoing lines is provided in each group switching section and each of a number of incoming lines are adapted to be connected with any one of the outgoing lines. Intermediate trunk lines, having at their disposal different lines of each numerical group, extend between the incoming and outgoing lines. Connecting means, individually alloted to the various lines, are adapted to effect the connections at both ends of the intermediate trunks. Separate selecting means, alloted in common to the incoming lines, are adapted to select the group wanted and an intermediate trunk available for the connection.

1,162,899. December 7, 1915. TELEPHONE INDICATOR; H. E. Beane, Bowling Green, Ky. The feature of this indicator is an electromagnetically operated rock shaft having a pointer and an arm. A spring connects the arm and a spring pressed armature pivoted within the casing which co-operates with one of two electromagnets mounted at an angle with one another.

1,162,992. December 7, 1915. POLE CHANGER; C. J. Erickson, Chicago; assigned to First Trust & Savings Bank, Chicago. A

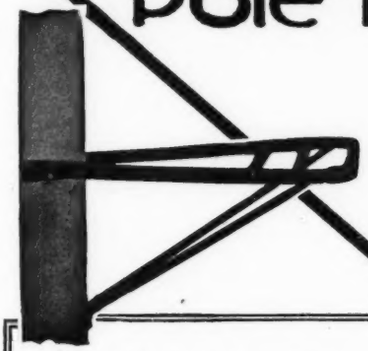




No. 1,162,556. No. 1,162,992.

polarizing permanent magnet is associated with an electromagnet and connected with a divided battery and a transformer. A vibrating pendulum, with provision for accurately adjusting its frequency, is operated by the electromagnet for reversing the flow of current in a local battery circuit through the primary of the transformer. The middle point of the battery is connected with one terminal of the transformer primary so that a spring, which is a part of the vibrating pen-

Pole Line Securities



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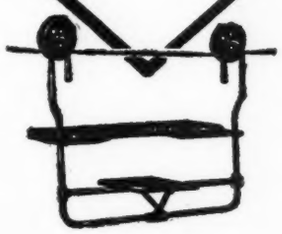

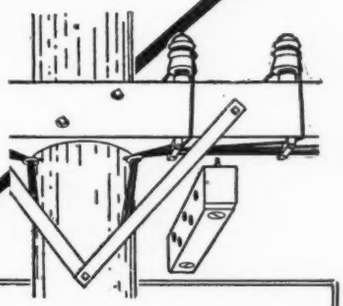

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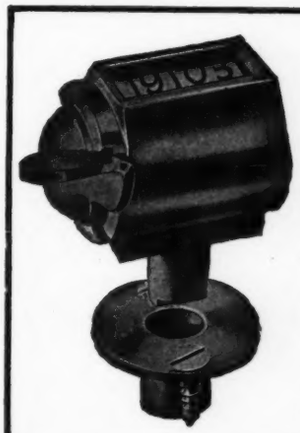

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dulum, is first in series with one division and then the other of the battery.

1,162,992. December 7, 1915. POLE CHANGER; C. J. Erickson, Chicago; assigned to First Trust & Savings Bank, Chicago. A polarizing permanent magnet is associated with an electromagnet and connected with a divided battery and a transformer. A vibrating pendulum, with provision for accurately adjusting its frequency, is operated by the electromagnet for reversing the flow of current in a local battery circuit through the primary of the transformer. The middle point of the battery is connected with one terminal of the transformer primary so that a spring, which is a part of the vibrating pendulum, is first in series with one division and then the other of the battery.

1,163,201. December 7, 1915. MECHANICAL SOUNDER FOR TELEGRAPH SYSTEMS; P. P. Banholzer, Philadelphia, Pa. A telegraph sounder is constructed so as to be adapted for attaching to the standard of a telephone desk stand. The vibrations set up by the sounder are transmitted to the telephone transmitter and sent out over the telephone line, clearly and distinctly. The device has no electrical connection with the telephone circuit.

1,163,267. December 7, 1915. DISINFECTANT HOLDER; F. Sayles, Longmont, Colo. A round case containing disinfectant, is suspended from the mouthpiece and clamped against the body of the transmitter. A tube extends from the holder into the mouthpiece so as to conduct the disinfectant vapor.

1,163,326. December 7, 1915. TELEPHONE ATTACHMENT; D. Y. Donaldson, Denver, Colo. A watch-case receiver and a standard transmitter are mounted upon a crank arm so dimensioned that when the receiver is raised to a position to the ear, the transmitter is in the proper position for talking purposes. In the normal position of the crank arm, the receiver and transmitter face downward and are arranged to travel in unison when the arm is rotated. A circuit closing lever is arranged to be operated when the crank arm is moved.

1,163,390. December 7, 1915. AUTOMATIC TELEPHONY; W. M. Bruce, Jr., Springfield, Ohio; assigned to International Automatic Telephone Co., Springfield, Ohio. A switch for automatic exchanges is described. A series of contacts is arranged in banks and a series of wipers provided, one set for each bank. The wipers are arranged to move step by step over the contacts by current impulses, each wiper forming a link in a circuit including one of the terminals. Through the current impulses passing through operating circuits, of which one is provided for each of the banks, one set of wipers may be disconnected and another set connected.

1,163,515. December 7, 1915. MONEY RECEIVING APPARATUS; H. A. Drew and G. M. Mazza, Weehawken, N. J.; assigned to Coin Device & Signal Co., New York. This money receiving apparatus is intended for use on telephone circuits. A signaling mechanism is installed at the central office and is operated by the depositing of a coin to indicate the denomination of the coin. Means are provided under the operator's control, for depositing the coin in the receptacle of the collector or refunding it, as desired.

Condensed News Reports

Officers of Companies Are Urgently Requested to Forward to Us Promptly All Financial and Other Statements as Soon as Issued and Any Items of Interest as to Their Plants and Systems

Personal.

E. C. KELSO, manager of the McCook, Neb., office of the Nebraska Telephone Co., has been promoted to the position of general city representative of the company in greater Omaha.

C. T. CHATHAM, manager of the Cumberland Telephone & Telegraph Co. at Mt. Sterling, Ky., for several years, has been transferred to Chipley, Fla., as manager of the exchange of the Southern Bell Telephone & Telegraph Co.

HAMPTON ROBERTS, local manager of the Pacific Telephone & Telegraph Co., at Woodland, Cal., recently tendered his resignation in order to devote his time exclusively to the management of a Woodland garage. Thomas Charles, of Willows, will succeed him.

W. H. IRWIN, who has been manager of the Cumberland Telephone & Telegraph Co., at Fulton, Ky., for the last eight years, has been transferred to Princeton, Ky., where he will have charge of the exchanges at Cadiz, Kuttawa, Eddyville and Fredonia. He is succeeded by W. T. White, Paducah.

Obituary.

CHARLES S. POWELL, manager and principal owner of the DeLand Telephone Co., DeLand, Fla., died recently after undergoing an operation.

E. F. WELLS, director and treasurer of the Home Telephone Co., of Portland, Ore., died recently at Portland from a stroke of apoplexy at the age of 64. He was a native of Brattleboro, Vt. After graduating from Cornell University he took up railroad work, entering the auditing department. During the construction of the Northern Pacific he was station agent for a number of years at Glendive, Mont. From there he went to St. Paul, where he remained for several years. During this period, about 30 years ago, he became acquainted with Samuel Hill, with whom he has been intimately associated since. When Mr. Hill began the organization of telephone companies in the Northwest Mr. Wells was recalled to aid him and he came to Tacoma in 1909, as director of purchases and treasurer. A few months later he took up his residence in Portland as treasurer and purchasing agent of the Home Telephone Co.

New Companies and Incorporations.

GREENFIELD, IND.—The Ash Grove Telephone Co., has been incorporated with a capital of $160,00. The directors are S. S. Boots, J. M. Fisk, J. H. Sanders.

PROTECTION, KANS.—Citizens Rural Telephone Co., was recently incorporated with $5,000 capital stock by Geo. N. Johnson, E. G. Thorpe and Jacob Zimmerman.

KATY, TEXAS.—The Katy Telephone Co., has been organized for the purpose of installing a local telephone exchange. The incorporators are W. C. Stockdick, W. E. Freeman and G. A. Porter.

OCHILTREE, TEXAS.—The Ochiltree Telephone Co., was incorporated recently with a capital stock of $10,500. The incorporators are J. N. Stump, C. E. Forbes and W. E. Forbes.

Financial.

HENDERSON, N. C.—An amendment was filed recently for the charter of the Home Telephone & Telegraph Co. by which the capital is increased from $500,000 to $1,000,000. F. C. Toepleman, who holds 290 shares of stock is named as agent in charge and general manager. The Southern Bell Telephone & Telegraph Co. is specified in the amendment as owning 5,083 shares of stock, the next largest stockholder is J. P. Taylor with 1,622 shares.

WESTHOFF, TEXAS.—The Bell Telephone Co., of Westhoff filed amendment decreasing capital stock from $4,000 to $3,125.

Miscellaneous.

SANTA ANA, CAL.—The Pacific Telephone & Telegraph Co., has purchased a site at the northeast corner of Fifth and Bush Streets and will erect a new building for the offices and exchange of the company. The property is 80 by 100 feet. The building now on the site is to be removed within ninety days.

MAPLE PARK, ILL.—The DeKalb County Telephone Co., is to improve its service in the near future. In order to avoid all interference from the high tension electric wires running through the village, the company will put all overhead wires in cables.

EVANSVILLE, IND.—Extensive improvements in the telephone system of the Southern Telephone Co., of Indiana are contemplated for the coming year. An all-cable plant at Oakland City, Ind., will be one of the biggest improvements. Two other additional circuits between Evansville and Boonville, Ind., and other circuits to Petersburg, by way of Princeton, will be put in. The company is now installing a new plant at Newburg, Ind.

WICHITA, KANS.—The Bell Telephone Co., is planning to erect a $300,000 five-story office building in Wichita.

SYLVAN GROVE, KANS.—Sylvan Grove is to have a new telephone building. Eugene Cross, the manager, will begin at once the erection of a fine telephone office.

NEW YORK, N. Y.—The New York Telephone Co., recently filed plans for a two-story telephone exchange to be erected on plot 65 by 120 on the north side of 175th street, 100 feet east of Wadsworth Avenue, running through to 176th Street. The cost is placed at $93,000.

Telephony.

THE AMERICAN TELEPHONE JOURNAL

PUBLISHED EVERY SATURDAY.
TELEPHONY PUBLISHING COMPANY.
VOLUME 69, NO. 26.

CHICAGO, DECEMBER 25, 1915.

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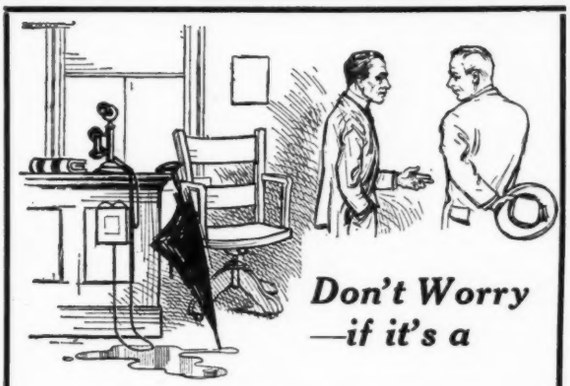

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It costs but 30c TO 75c PER MONTH or $3.60 to $9.00 per year for current to operate this machine.

COMPARING THIS COST with $4.00 to $7.00 per month or $48.00 to $84.00 per year for current to operate a motor generator set or $25.00 to $50.00 per year for batteries plus the trouble of connecting them up and continual testing when using a pole changer, the object of the LEICH FREQUENCY CONVERTER at once becomes obvious.

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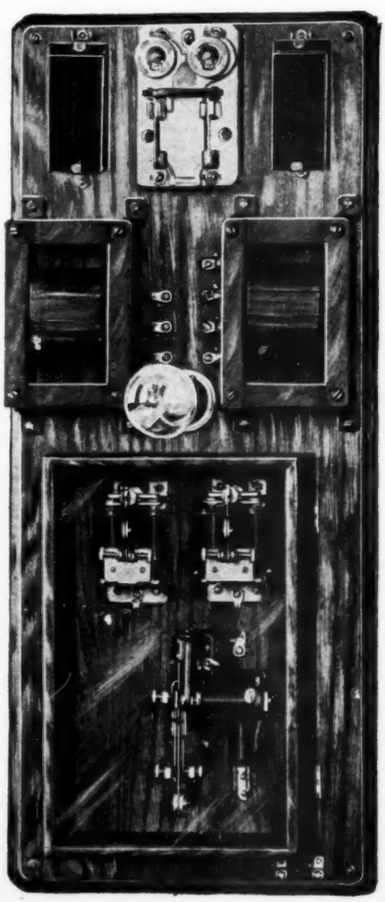

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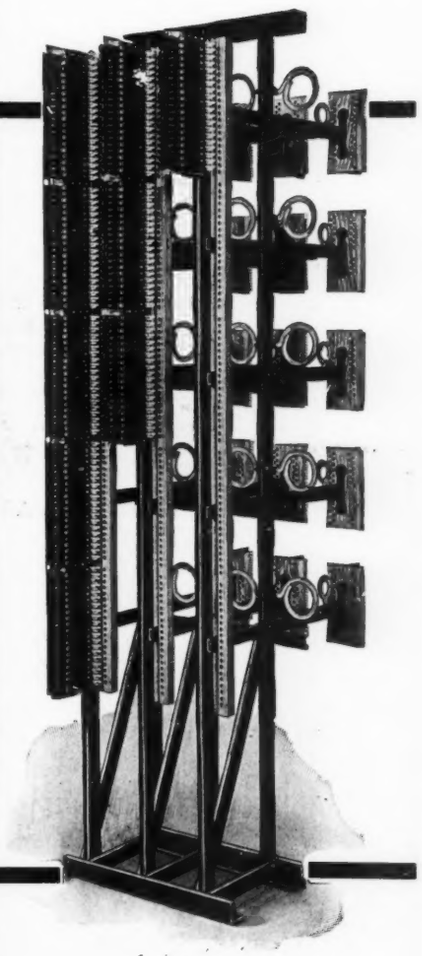
Mica Fuses (Cook's type)
Marlin Cable Hangers
Messenger Hangers
Messenger Splices
Protected Pole Cable Terminals
Switchboard Protectors
Subscribers' Station Protectors
Test Connectors
Toll Line Arresters
Unprotected Pole Cable Terminals
"U" Bolt Clips
Wall Type Distributing Frames
Wire Sleeves, steel and copper
Etc., Etc., Etc.



Type L Distributing Frame and Protector

To those who are not familiar with all of Cook's Specialties it will be worth while sending for a copy of "The Brown Catalog"

Frank B. Cook Co.

326 W. Madison Street
Chicago Illinois

"The World's Our Market"

Kellogg Desk Type Switching Servic

Practical convenience and efficiency in modern magneto and P.B.X. switching equipment is nowhere better illustrated than in our most attractive new desk type cabinets.

Increased Shelf Room Adds to Convenience

Here we find extreme compactness, especially desirable in boards serving small private exchanges, in hotels and offices, where space is at a premium.

For magneto switching, likewise, particularly in boards serving small centers of telephone population, where often times the board itself must be placed in general stores, drug stores, etc., not only is compactness necessary, but the desk type equipment is advantageous in many ways.

Even in the larger magneto exchange, where a separate switchboard room is possible, the real advantages of space saving and convenience in the desk type cabinet are marked.

Added to these points of Kellogg superiority in this equipment, are the particularly practical and service improving equipments possible to install, to suit every operating condition met with in these types of service.

for Every Practical Exchange Use

Not the least interesting, in point of investment and service, is the fact that these Kellogg standard circuits and cabinets are designed and built for installation in your exchange at the lowest price consistent with good, maintenance saving, operating for many years. No one can get this long, high class service with bargain counter equipment.

The proof, should any be needed, is in the amount of apparatus "junked" yearly, either of cheapest construction, or that was revamped and sold as new.

Let us know what you need now, or will be in the market for this spring, in magneto or P.B.X. switchboards, and we will show you standard equipment of the highest grade to exactly fit your conditions of operating.

Using Ordinary Office Chairs an Added Saving

"It's the Economy of Kellogg"

Kellogg Switchboard & Supply Company

Main Office: CHICAGO, ILL.

Branch Offices: KANSAS CITY, MO.; SAN FRANCISCO, CAL.

Please tell the Advertiser you saw his Advertisement in TELEPHONY.

Some 1915 Accomplishments

Common Battery Multiple Switchboard Installations

The GARFORD MANUFACTURING Co.
ELYRIA, OHIO.

Branch
The Garford Mfg. Co.
Kansas City, Mo.

Distributors { *Dean Electric Co. Seattle, Wash.*
Dean Electric Co. Los Angeles, Cal.
Sumter Tel. Supply Co. Sumter S.C.

Please tell the Advertiser you saw his Advertisement in TELEPHONY.

Making a Price

On telephone equipment is our last operation—The Big Idea always in mind is QUALITY. We plan and build for service, for permanence, for customer-subscriber satisfaction and the price is not considered in the production of our apparatus. What you want and what we are determined you shall have when you deal with us is equipment of the highest quality.

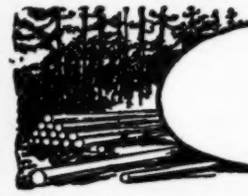
In buying a bond the price doesn't particularly interest you—security is the first consideration. In buying Telephone equipment QUALITY should be the first consideration, and we cater to buyers that are seeking the best, that buy for sake of quality and not for sake of low price.

We are prepared to offer you a service and class of equipment positively of the highest order and we solicit correspondence with operating companies that are interested in the purchase of Telephone equipment.

The **GARFORD MANUFACTURING Co.**
ELYRIA, OHIO.

Branch
The Garford Mfg. Co.
Kansas City, Mo.

Distributors { *Dean Electric Co. Seattle, Wash.*
Dean Electric Co. Los Angeles, Cal.
Sumter Tel. Supply Co. Sumter S.C.



CRAWFORD CEDAR CO.
MENOMINEE, MICH.
Northern Michigan White Cedar Western Red Cedar
Woods Run—**POLES**—Butt Treated
QUICK SHIPMENTS

NORTHERN-WESTERN
CEDAR POLES
A FULL ASSORTMENT OF SIZES
PROMPT SHIPMENTS ASSURED
T. M. PARTRIDGE LUMBER COMPANY
Lumber Exchange MINNEAPOLIS

CEDAR POLES
NORTHERN or WESTERN
Plain or Butt Treated
THE VALENTINE-CLARK COMPANY,
MINNEAPOLIS, MINN.
Toledo Chicago St. Maries, Idaho

"NAUGLE" POLES
Plain or Butt Treated. Largest Stocks.
READY FOR IMMEDIATE SHIPMENT
NAUGLE POLE & TIE CO.
Main Office: 59 E. Madison St. CHICAGO

CROSS ARMS
that always measure up to the standard required are manufactured by us. Rigid inspection and high standards of quality. NATIONAL quality Douglas Fir cross arms last longer than most materials. Let us quote you on your next order.
NATIONAL TANK & PIPE CO., 275 Oak St., Portland, Ore.

"FREE"—A book of complete Instruction with each System.
COFFEY SYSTEM AND AUDIT CO. Indianapolis, Ind.

Idaho Cedar Poles
Northern Mercantile Co. Ltd.
Resident Producers
Sand Point, Idaho

NORTHERN COAST TIMBER COMPANY
RED CEDAR POLES
TACOMA WASH.

Duluth Log Company
POLE SERVICE
Duluth, Minnesota

From **POLE** to **POLE**
you will find none better than the
IDAHO CEDAR POLES
We produce in our own Forests.
Sound in Quality. Right in Price.
Large Stocks. Quick Service.
Sandpoint Lumber and Pole Co.
Sandpoint, Idaho

W. C. STERLING & SON CO.
POLES OF
STERLING QUALITY
Oldest Cedar Pole Firm in Business — Producers for 35 years
MICHIGAN AND WESTERN CEDAR
W. C. STERLING & SON COMPANY
1880 MONROE, MICHIGAN 1915

SWISHER CABLE HANGERS

The Greater the Strain
Fellows, Here's a Real Cable Hanger—
Five of us—all cable men who've been there designed it.
It combines our most practical ideas and the company's best efforts with highest grade materials.
We knew what was needed and what would be expected for cost-cutting price. If you want to bring those depreciation charges down to rock-bottom, investigate the SWISHER.
The Better They Hold
NATIONAL TELEPHONE SUPPLY CO.
CLEVELAND, OHIO

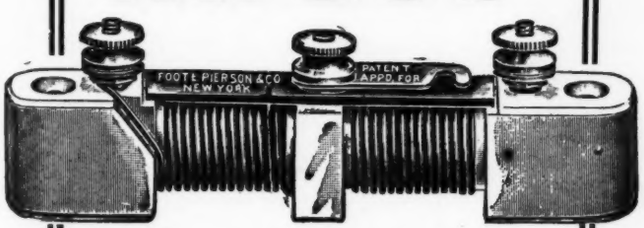
Please tell the Advertiser you saw his Advertisement in TELEPHONY.

The Easy Way To Prevent Decay—REEVES WOOD PRESERVER

Applied with a brush like paint—or by dipping. No heating or mixing. One or two cheap laborers are the only "treating plant" needed.
May we send you a sample to test and tell you more about it today?

THE REEVES COMPANY, MFRS., NEW ORLEANS

ARGUS



LIGHTNING ARRESTER

Reliable Protection—

is bought at a reasonable price—it is the unreliable that is so expensive.

A type of arrester that can be easily and safely installed on your lines and relied upon to protect them at all times.

They instantly remove static discharges without grounding or disturbing the line, nor injuring the instrument itself.

Let us mail you literature describing the ARGUS

FOOTE, PIERSON & COMPANY
160-162 Duane Street New York City

CEDAR POLES

Northern White Cedar. Butt Treating. Western Red Cedar.

CHICAGO *19 S. La Salle St.*
MINNEAPOLIS *Plymouth Bldg.*
HOUSTON, TEX. *1517 Carter Bldg.*

PAGE & HILL CO.

Is There a Beginner You Want to Boost?

Is there a new telephone man you are interested in starting right, send us his address and one dollar, and we will take him along for twenty consecutive weeks, beginning with the new year—and maybe he will get the habit!

TELEPHONY PUBLISHING CO., Monadnock Block, CHICAGO

ORANGEBURG FIBRE CONDUIT

is not a mere spiral wrapping. It resembles hard rubber.

Book "H"

THE FIBRE CONDUIT CO.
ORANGEBURG, N. Y.

NEW YORK BOSTON CHICAGO SAN FRANCISCO

YESBERA TOLEDO TELEPHONE BOOTHS

Our Folding Door Booth

This is the "last word" in booth construction, to date. Contains many special features. Before you buy find out about this new YESBERA folding door booth.

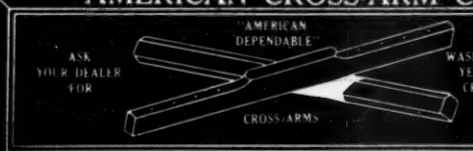
Write For Booklet and Catalogue

These will tell you the whole story about our line of booths. We want you to be posted, whether you intend to buy now or not. No obligations.

The Yesbera Mfg. Co.

Office: 2308 Albion St., Toledo, Ohio

AMERICAN CROSS-ARM CO.



CHICAGO

TELEPHONE BOOTHS

Folding Door, Special and Standard

Interchangeable Unit Office Fixtures and Partitions

Write for Catalog

C. H. BROWNELL, PERU, IND.

RELIABLE CABLE COMPOUND

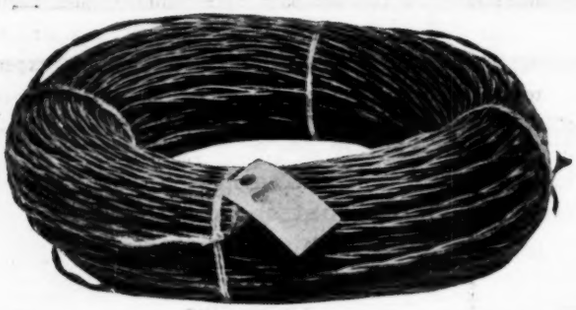
is carefully made for filling pot-heads and cable terminals and for general electrical work. It has high insulating qualities, is elastic and non-corrosive and melts at 190° Fahrenheit.

Reliable **Electric Company**

Standard Package, 1 Gallon

Weight, 10 lbs. per gallon

411-417 S. Sangamon St., Chicago, Ill.



Reduce Installation Cost With

IRONITE

The Ideal Duplex Drop Wire

Ironite does away with a big part of your installation cost. Stops complaints—eliminates sagging wires; and raises the standard of your service.

Cheapest drop wire on the market. Equally satisfactory in any climate. Get it from your jobber. If he doesn't have it, order direct from us. Big free sample.

Paragon Electric Co.

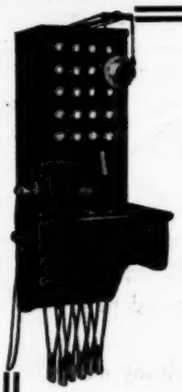
Madison-Terminal Bldg. Chicago, Ill.

610 First Ave., Seattle

212 W. Third St., Los Angeles

86 Third St., San Francisco

Central Electric Supply Co., Ltd., Toronto, Agents for Ontario. Houston & Company, Ltd., Winnipeg, Agents for Manitoba



12 Ringer Switchboard

is for rural or party line service, equipped with 12 ringer movements and associate jacks furnished with 3, 4 or 5 complete cord circuits, long distance transmitter and receiver, heavy 5 bar hand power generator, batteries and everything complete. This board can be furnished with a less number of ringer movements installed if desired.

Yours for SERVICE

Swedish-American Telephone Mfg. Co.

5237 Ravenswood Ave., Chicago

Guaranteed to make good, because made good enough to guarantee

Manhattan Electrical Supply Company

New York Chicago St. Louis Frisco

Factories:

Jersey City Ravenna, O.

BRACH'S Type 36
Vacuum Lightning Arrester

A model of the most efficient form of lightning protection—the VACUUM ARRESTER. Extremely sensitive to all static currents, giving absolute protection to your lines and equipment.
Use them and watch your maintenance charges drop.

Drop Us a Line for Our Catalog and New Prices

L. S. Brach Supply Co.

129 Sussex Ave. Newark, N. J.

No. 36

"DIAMOND X"

EXPANSION SHIELD

for

LAG SCREWS

Equal Results At Lower Cost

REDUCES

Original Cost of the Expansion Bolt
Diameter of hole to be drilled
Cost of drilling
Time required to install
Your total cost of making attachment

PATENTED

Oct. 5, 1915 { U. S. Pat. No. 1,155,613 / U. S. Pat. No. 1,155,614 / U. S. Pat. No. 1,155,615

Screw enters shield on center

Screw emerges at side and contacts directly with wall

This new expansion shield is designed for heavy work. Its simplicity, being composed of but one single unit, will recommend itself to telephone engineers for construction work requiring attachment of equipment to stone, brick or concrete buildings.

Its principle of operation is the most radical development in expansion bolt design. The screw contacts on one side directly with the hole in the wall. The enormous displacement of metal at the further end is what gives it its powerful expansion at the inner end.

SEND FOR SAMPLE.

Diamond Expansion Bolt Co.

Manufacturers Diamond Specialties

90 West St., Cor. Cedar, New York

Western Electric Company

DISTRIBUTORS

Manufacturers of the 8,000,000 "Bell" Telephones

New York	Atlanta	Chicago	Kansas City	San Francisco
Buffalo	Richmond	Milwaukee	Omaha	Oakland
Philadelphia	Savannah	Indianapolis	Oklahoma City	Los Angeles
Boston	New Orleans	Cleveland	Minneapolis	Seattle
Pittsburgh	Houston	Cincinnati	St. Paul	Portland

St. Louis Dallas Denver Salt Lake City

EQUIPMENT FOR EVERY ELECTRICAL NEED

Member Society for Electrical Development. "Do it Electrically"

ERICSSON STEEL TELEPHONES

Five Reasons Why You Should Use Them

1st — They are the handsomest telephones made, and subscribers are pleased with them and take pride in keeping them neat. They put a stop to chronic kickers.

2nd — They are built to last almost indefinitely. The black enamel finish will outlast any known wood polish and will match any color of woodwork or inside finish.

3rd — They cost no more than reliable telephones of other makes, and are worth considerably more to you. They do not deteriorate and they save you the heavy maintenance expense you have been accustomed to with others.

4th — They are made by a manufacturer with a reputation for making the best telephone apparatus known. Their guarantee makes you safe.

5th — You will be using Steel Telephones altogether some day, so why not begin now. The sooner you get acquainted with the Ericsson kind the better pleased you will be later.

BRANCHES AT

Atlanta, Ga., 83 Marietta St.
Birmingham, Ala.
Boston, Mass., 451 Atlantic Avenue.
Butte, Mont., 53 East Broadway.
Cedar Rapids, Iowa, 315 So. Second St.
Chicago, Ill., 14 N. Franklin St.
Cleveland, O., 124 St. Clair Ave., N. E.
Edmonton, Alta, Can., 504 Agency Bldg.
Havana, Cuba, P. O. Box 6.
Indianapolis, Ind., 124 So. Meridian St.
Jacksonville, Fla., 24 W. Forsythe St.
Lincoln, Neb., 136 So. 10th St.
Los Angeles, Cal., 1233 So. Olive St.
Louisville, Ky., 514 W. Main St.
Minneapolis, Minn., 19 N. 6th St.
New Orleans, La., 810 Canal St.
Pittsburgh, Pa., 31 Terminal Bldg.
Portland, Ore., 329 Ankeny Ave.
Richmond, Va., 5 Governor St.
San Francisco, Cal., 530 Golden Gate Ave.
Spokane, Wash., Paulsen Bldg.
Toronto, Canada, 36 Adelaide St.

ERICSSON MFG. COMPANY

1102 MILITARY ROAD :: :: BUFFALO, N. Y.

Copy for classified advertising for the current issue should reach us not later than Thursday morning when forms close Rates for classified advertising five cents a word. Minimum advertisement one dollar. Cash must accompany advertising.

"Rebuilt" Telephone Apparatus

and exchange equipment saves you 30 to 50 per cent without sacrificing quality or efficiency.

Switchboards

—Telephones—Apparatus—Protection Equipment—Cable—Everything you need for the installation and operation of a complete exchange—Magneto or Central Energy—of the best and most reputable manufacturers.

Eight Years Successful Operation

of our "Rebuilt" Equipment Department puts it past the experimental stage. Quality and price will make you a permanent customer. Better investigate.

Ask for Our Free No. 78 Bargain Bulletin, Address "Rebuilt" Equipment Department

PREMIER ELECTRIC COMPANY Chicago, Ill.
"REBUILT" when connected with PREMIER means something

Directory Hangers

WE BEG TO DIRECT YOUR ATTENTION to the Universal Wire Loop, an improvement upon the ordinary string loop for hanging up catalogues, directories, telephone books, prices current, etc. Write us for prices and samples. Wire Loop Mfg. Co., 75 Shelby St., Detroit, Mich.

Miscellaneous

What is it costing you to clear your trouble? Do you keep a record of Batteries, Auto Mileage or Trouble Man's time? My record tells it all at a glance. Loose leaf at $3.50. Address: F. A. Bowdle, Cerro Gordo, Illinois.

WANTED—Telephonys for January, 1905, and July 31, 1909. Geo. R. Fuller, President, Rochester Telephone Co., Rochester, N. Y.

For Sale

FOR SALE—Good telephone exchange for sale; easy terms. Six thousand dollars income annually and only two or three thousand required as first payment. Address: A. L. Clark, Morocco, Ind.

FOR SALE—Exchange in one of western Montana's best towns. 210 telephones. Good rates. Plant new in 1913. Excellent chance for development. Address: 2265 care TELEPHONY.

Exchange, lacking extension funds, will sell. Midway Pensacola, Mobile. Growing country. No sleets. Part cash. Investigate. Harry Beyerly, Loxley, Alabama.

An up-to-date central energy telephone plant, Dean equipment, over 1,265 phones; located at county seat, within the famous corn belt of Minnesota. Plant is in a very good condition. Controling interest or more for sale. Gross income $22,000 per year. Address 2208, care TELEPHONY.

Help Wanted

WANTED—Combination cable and switchboard man. Permanent position and good wages for a first-class man able to use bridge and do switchboard maintenance and installation work. Write full experience and references to 2280, care TELEPHONY.

Repairing

SEND YOUR PARTS FOR REPAIR TO US.—You'll save money by shipping us all of your repair work rather than to the original manufacturers. Save on the shipping cost as well as the labor cost. Satisfaction guaranteed. Give us a trial. The Suttle Equipment Co., Olney, Illinois.

Positions Wanted

WANTED—Position by A-1 combination telephone man. Have had ten years' experience. Four years on P. B. X. Interphone and Instrument work. Am married and steady. Can give best of references. Would take job in small town. Wife can operate. Address: 2100, care TELEPHONY.

POSITION WANTED—By capable switchboard man, cable man and lineman. Steady position about January 1, 1916. Fourteen years in the business. Address: 2279, care TELEPHONY.

Coil Rewinding

Careful work saves 50% on rewinding. Net prices on request. Frank L. Whitaker, Electrical Instrument Maker, Clay City, Ind.

Ribbons for Calculagraph

Our price 25c each—$2.50 dozen. At first they didn't believe they were any good at half price. Real reason—no competition. Over 1,500 customers now. HORNEY & COMPANY, Lafayette, Ind.

Telephone Plant Construction

WHEN YOU BUILD A NEW EXCHANGE or rebuild your old one, you will save money by consulting with us. Correspondence solicited. Home Electric Construction Co., Macomb, Ill.

Telephone Supplies

WE ARE JOBBERS. Get our prices on telephones, wires, pins, brackets, poles, cross arms, glass insulators—pole line hardware. Indianapolis Elec. Supply Co., Indianapolis, Ind.

CONSTRUCTION SUPPLIES—Anything you need for your construction work can be ordered from us at prices that can't be beat. Doubleday-Hill Elec. Co., 721 Liberty Ave., Pittsburgh, Pa. Southern Warehouse, 727 12th St., N. W., Washington, D. C.

Sales Representative

Sales Agent covering Indiana and adjacent territory can advantageously handle strong line of construction materials or specialties. Possess qualifications and experience to make good. Address: 2277, care TELEPHONY.

"Buyers" Reference Index

The letter with accompanying number indicates the name of advertiser as given in full in the Alphabetical Index to Advertisers, on the opposite page. *When making known your wants* to any company listed herein, please mention TELEPHONY.

Aerial Cable Rings
C6, D9, E10, N9, S25.
Alligator Wrenches
R9.
Anchors, Guy
C47, E20, D10, F3, G8, J5, M12, W20.
Anchors, Twist
G8, F3, P10.
Appraisers
G6, J3, L9, M2, P4, S32.
Arms and Brackets (for holding telephones)
A13, C35, S35.
Arms, Cross
A10, B10, K6, N19, S18, W20.
Arresters, Lightning (See Protective Devices)
Asbestos
J5.
Attorneys, Patent
C30, D15, M2, W4, W11.
Auditing, Accounting
C32, G6, P3.
Auto Trucks
W24, G4, I12.
Automatic Telephones
A22.
Bars, Tamping and Digging
H8, K8, L4.
Batteries, Dry
A13, F14, J5, M5, N17.
Batteries, Primary
E3.
Bells, Magneto
A13, S6.
Blank Books, etc.
T3.
Bolts and Nuts
D9, H8, L4, R7.
Bolts (Expansion)
C20, D9, H8, L4, S25, P10.
Bolts (Toggle)
D9, H8, L4, S25, W12, P10.
Bonds
N3.
Books
D10, S22.
Booths, Telephone
B18, F16, Y2.
Boxes, Battery
E17, P7.
Cable
A15, A16, A25, I5, R9, S12, S23.
Cable Cars
B10, F1, H1.
Cable, Clips (See Clips, Cable)
Cable Hangers (See Hangers, Cable)
Cable, Rollers
B10, H1, M12, R9.
Cable Splicing Joints
F9, M12.
Cable Terminal
C38, H1, R0.
Cableways
R9.
Carboy Inclinator
M30.
Carbon
F14, M5, N17.
Clamps, Ground (Plates, Cones)
B15, C3, F1, F2, N2, P7, S25.
Clamps, Guy
C38, C47, E20, F2, H8, L4, M12, N9, R0.
Clamps, Lamp
M32.
Climbers
B19, C27, K8, S15.
Clips, Cable
A25, C38, M12.
Cliffs, Testing
F1, F11.
Clocks
R17, S33, W1.
Composition, Insulation
E11, G2, S9.
Concrete Mixers
S14.
Condensers
A13, A25, E6, M7.
Conduit, Underground
B17, C7, F8, J5, M4, W20.
Connectors, Test
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Connectors, Wire
C38, N9, R0.
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Copper Cables
R9.
Copper Strand
R9.
Cord Adjusters
M12.
Cordage, Telephone
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Counters
V4.
Creosoting
W20.
Cross Arms
N19.
Distributing Racks
C38, H1, R0.
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Fibre
C35.
Fire Alarm Systems
B0, F10.
Flux, Soldering
A25, B4, B7, B13, B15, B22, D18, H6.
Fuses, Mica
C38, H1, R0.
Generators, Ringing
H7, W2, H6.
Gloves
M31.
Grounding Device
B15, C3, F1, P7.
Guy Anchors (See Anchors)
Guy Clamps (See Clamps, Guy)
Hangers, Cable
B10, C3, C38, E10, E17, E20, H1, M12, N9, R0.
Improved Party Line Systems
A4, A17, A26, D4, S22.
Instruments, Cable (Fault Finding)
E9, M12, S32, T6.
Insulators
E17, H3, I3, P7, U2.
Insulated Copper Wire
R9.
Insurance, Fire and Employers' Liability
U3.
Intercommunicating Systems
A4, A17, A25, K5, S35.
Iron, Norway
N1, A29.
Joints, Cable Splicing (See Cable Splicing Joints)
Motor Trucks
R6, W24.
Netting
R9.
Office Fixtures
B19.
Operator Chairs
H4.
Operators' Supervising Sets
A25.
Overhead and Underground Construction Work
S13.
Parts, Special Telephone
A4, A13, A22, A25, C42, E11, G1, G2, H9, K5, S9, S22, S35, S53.
Pay Stations
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Pins and Brackets
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Pipe Locater
M12.
Platinum
B3, H6.
Pole Changers
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Pole Height Estimator
M12.
Pole Jack
T7.
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Poles, Steel
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Powder.
D21.
Preservatives, Wood
C10, R2, W20.
Printing
P10, T3.
Protective Devices
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Rope Fitting (wire)
R9.
Second Hand Equipment
P16, R2, W15.
Securities
N6.
Selectors
H2.
Semi-Automatic Systems
C38.
Sleeves, Cable
F9, M12.
Sleevings
D18.
Solder, Sticks, Paste, Salts, Liquids, etc.
B4, B7, B13, B15, B22, D18, H6, A-31.
Soldering Irons
C38.
Soldering Furnaces, Torches
C48, T10.
Splicing Clamps, Pliers, etc.
A13, A19, A25, B10, C12, C38, J5.
Strand
R9.
Suspension Bridges
R9.
Supplies
C27, C38, K8, S15.
Staples, Insulated
B13, B17, K5, M5, M22.
Switchboard Cable
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R9.
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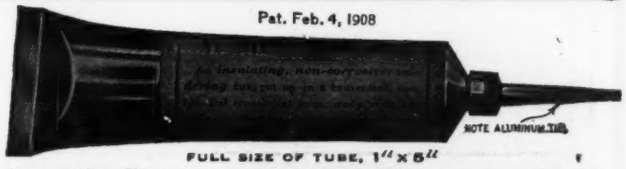

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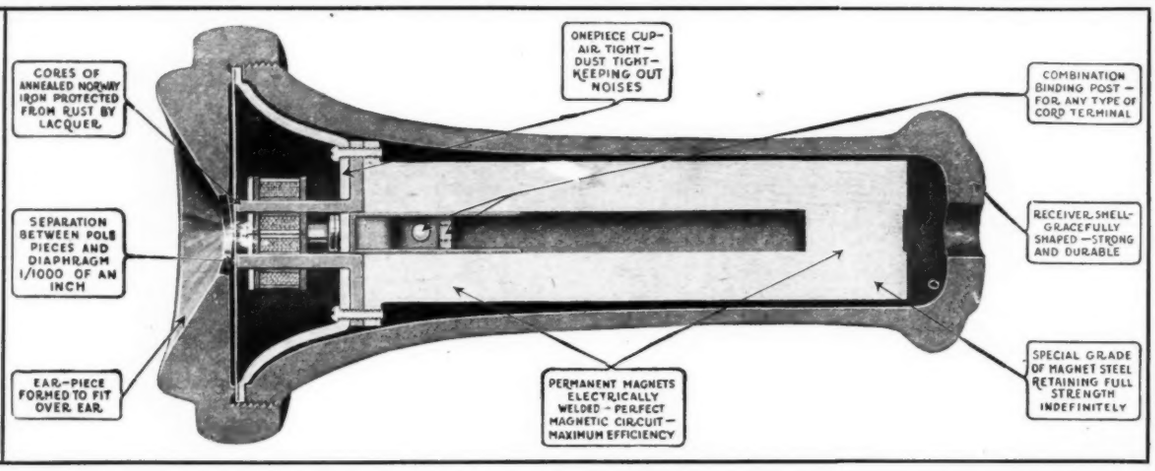
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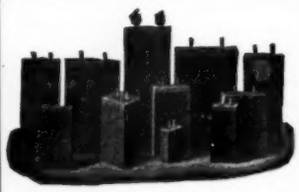

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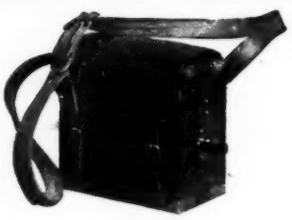

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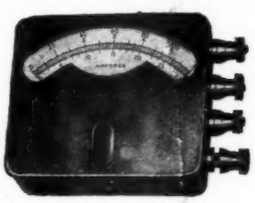

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